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SCIENCE AND INDUSTRY

Contractors and Engineers Monthly

Vol. 39, No. 6 JUNE, 1942 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Assembly Line at Dry Dock**
  Production-line methods applied to the assembly and welding of tremie trusses for a Navy dry dock are speeding the completion date. See page 1.
- **Chlorides on Winter Grade**
  Future access road construction during the winter months can be continued on schedule by the use of calcium chloride to prevent freezing of the subgrade ahead of paving, as was done on two Maryland wartime jobs. See page 2.
- **More Service with Less Gas**
  The conservation of gasoline and increased efficiency from gasoline engines are vital to the war effort. Ways and means of accomplishing both of these objectives are discussed in this issue. See page 2.
- **Restricted Use of Bitumens**
  The effect of the order of April 24, restricting the use of bituminous materials, on the annual asphalt and tar road-maintenance programs in New England is discussed in a series of interviews with highway officials in those states. See page 7.
- **Dealers' Wartime Service**
  The place of the equipment and material distributor in the wartime construction program and the various services he is rendering to his country, to contractors, and to manufacturers are described by a well-known distributor. See page 15.
- **Sand-Clay-Cement Taxiway**
  An army airport taxiway required the preparation of a heavy clay subgrade for cement stabilization before fast mixing of contiguous 10-foot lanes over the entire area. See page 19.
- **Flood Control Projects**
  Two of the U. S. E. D.'s flood-control projects, now being speeded to protect important industrial areas from damaging floods, include work in New York State and Ohio. See pages 23 and 43.

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Dry Dock Tremie Trusses On Fast Production Line

"LET'S KEEP THE FLAG FLYING"

Old Glory is flying today over hundreds of new Army camps, air fields, Naval bases and munitions plants built by American contractors. Constant and thorough maintenance of equipment in the field will carry this tremendous program of construction for war through to speedy completion and final Victory.

A 1,600-Foot Yard With Assembly Line, Spot and Bead Welding, Operated on Eastern Dry Dock Project

✦ THE assembly of forty-three tremie trusses which act both as forms and reinforcing for the foundation of a new graving dock being built by the U. S. Navy on the eastern seaboard progressed with remarkable smoothness. A production line was created, consisting of two parallel single tracks and a 1,600-foot length of double track, 14 feet center-to-center of tracks, for the final assembly of the panels into trusses. Coordinated with this was the driving of foundation piles of 10-inch H-beams in the dock area, cutting them off accurately with gas torches in 70 feet of water, the lifting of the truss units, weighing about 140 tons, from the final assembly line on land and placing them on prepared cradles on barges.

These barges with their decks nearly awash, each carrying a great box truss 191 feet long, 20 feet high and 14 feet wide, were towed into the basin where the trusses were accurately seated on the four foundation piles by the same two great floating derricks, the Los Angeles and the Century, which had so skillfully picked them from the shore and spotted them on the barges. Lashed end to end, the two Merritt-Chapman & Scott Corp. derricks operated as a unit without shouting or confusion; with just a whistle, or a gesture, the work went on without a hitch.

Initial Assembly

Frames measuring 65 x 14 feet, comprised of I-beams, angles and plates, were received on flat cars from the fabricator. These were then placed on assembly jigs of steel plates and timbers mounted on flat cars, and an additional section 65 feet long and 6 feet wide was bolted on and then welded to form a panel 65 x 20 feet. A complete tremie truss is composed of six of these panels covered with corrugated metal sheeting, connected with cross members, reinforcing, and having special bearing footings.

Sheeting and Spot Welding

Station 2 in the assembly of the tremie trusses was a welding shed with wide doorways at either end hung with tarpaulin to cover them during windy and cold weather. The assembly track ran completely through the shed with a run-around track to a second similar shed. Each of these welding sheds was equipped with an automatic spot welder

(*Continued on page 12*)

Subgrade Protection And Winter Paving On Access Roads

Calcium Chloride Selected By Maryland Road Engineers To Prevent the Freezing of Subgrade and Concrete

By EDWARD H. NUNN, Construction Engineer, State Roads Commission of Maryland

(*Photos on page* 56)

✦ TWO highway projects, both serving primarily as military access roads although also carrying some civilian traffic, were recently completed in Maryland. One of these involved the widening of the existing 16-foot concrete roadway to 24 feet by the addition of two 4-foot concrete strips and resurfacing the entire surface with a 2-inch hot plant-mixed bituminous material. The second project required the construction of a 24-foot roadway, with curb and gutter, and channelization of its intersection with a main highway.

Work started early in December and therefore the engineers were faced with the problem of cold-weather concreting and the protection of the subgrade from freezing between the time the grade was prepared and the placing of the concrete. The fact that there would be extended periods of sub-freezing weather required positive protection of the subgrade if an uninterrupted paving schedule was to be maintained.

Maryland's winter temperature is frequently 10 to 15 degrees F., with the thermometer occasionally falling to zero or below. Precipitations of rain and sleet are fairly frequent and the average annual snowfall is 27 inches. The most difficult feature, from the construction standpoint, is the great variation of temperatures in relatively short intervals. It is not uncommon to have maximum temperatures of 50 to 55 degrees F., with a minimum of 35 to 40 degrees, for 48 or 72 hours and then between sundown and midnight have the thermometer drop to 10 or 15 degrees. This is further aggravated by moderate rains, sufficient to wet the subgrade thoroughly during the non-freezing period, thus causing excessive frost in the grade.

Solving the Weather Problem

Various methods of protecting the operations from the weather were considered. First, attention was given to steam heat, the main advantage of this method being the positive control of temperature within the protective cover over the grade and pavement. However, it has many disadvantages, including the high cost of rental or purchase of boiler, pump, steam and water lines, lumber and canvas covering, etc., with high maintenance cost on such equipment. The excessive moisture in the subgrade from the condensation of steam would require additional preparation or reconditioning prior to paving; there would be considerable loss of production due to the cessation of paving operations while the covering was moved ahead and set up and the subgrade reconditioned; and the labor costs and equipment rentals would be excessively high because of production loss. Although the prime requirement of the projects was completion at the earliest possible date, with cost a secondary consideration, nevertheless studies of the use of artificial heat clearly showed that costs would be very high and the rate of progress unsatisfactory.

The use of chemicals for the protection of the subgrade and concrete was then investigated, and calcium chloride was selected on the basis of the following conclusions: it is an inexpensive material, with low costs for placing; the subgrade would need no reconditioning and the necessity for moistening the subgrade prior to paving would be eliminated; it provided a reasonable control of freezing; the frozen material excavated could be salvaged for use on the earth shoulders when the paving was completed; no additional equipment was required, and the paving operations could proceed without interruption, resulting in lower labor costs and equipment rentals.

Accordingly, calcium chloride was used on both projects and the results justified the selection, in economy and effectiveness. Considerable variations of temperature, with some rain and snow, occurred during construction, but at no period was there any loss of time due to frozen subgrade or because of the need for reconditioning the grade.

Rehandling soil thawed with calcium chloride on an access road.

Grading

Grading on the second project was started on December 15, 1941, with an air temperature of 55 degrees F. By December 20, sufficient grade had been prepared to permit the start of paving operations and it was decided to begin paving on Monday, December 22. Air temperatures had been ranging from 50 to 60 degrees F. during excavation and no precautions against freezing were taken on Saturday, December 20. On Sunday there was a moderately heavy rain which made the grade too muddy for paving. Monday night the temperature dropped to 2 degrees and the grade froze. Consistent low temperatures continued for four days, and the grade was frozen to a depth of 24 inches

(*Continued on page* 16)

Greater Service On Less Gasoline

Some Do's and Don't's in The Use of Gasoline to Help Decrease Its Consumption And Increase Efficiency

By RALPH BAKER

✦ ARE *you* getting the maximum gasoline service you can expect from your cars, trucks, or stationary engines? If so, you are the exception, for it is safe to say that the fuel consumption of nine out of every ten cars or trucks on the road could be cut at least one-fourth, and a great deal less gasoline used in most motors on compressors, pumps, conveyors, and other equipment.

Maximum economy is largely a matter of all working parts of the mechanism functioning in harmony according to specifications determined by the manufacturer. With use, these parts are more or less affected, with a consequent decrease in efficiency and less economy. Since economy depends on the condition of the entire equipment, the best way of insuring it is by means of periodic tune-up and conditioning.

The average tune-up costs from $3 to $5, and every 5,000 miles or its equivalent is not too often to have it done. Like going to the dentist regularly, it saves money and grief in the end.

When most people think of economy, they think of the carburetor, and that is of first importance, but it is only one of the many things which affect mileage. Inefficient spark plugs may cost you from 1 to 3 miles per gallon, a dragging brake can easily pull off another mile, dirty points, tight wheel bearings, weak battery, all take their toll.

Carburetor

The carburetor is of first importance.

(*Concluded on page* 20)

County Road Funds Audited Every Month

Simplified Accounting in Norman County, Minn., and Streamlined Road Section Cut Costs; New Garage

(*Photos on page* 56)

✦ ACCURATE accounting reduced to its simplest terms seems to have been accomplished by the Norman County Highway Department, with headquarters at Ada, Minn. By the very simplest fundamental records, complete reports of the costs of all operations, equipment repairs and materials are checked with the county auditor every month and tally to the penny.

Daily Report

The basis of this accounting system is the daily report turned in by all operators. This is determined from a Servis Recorder attached to each piece of equipment. The daily report forms, measuring 8 x 5½ inches, are printed to fold at the center and stapled to serve as an envelope in which to file the record made by the Servis Recorder. On one side of the envelope are spaces for the unit number, date, and operator's name, as well as for the road numbers, kind of work, and the hours of equipment operation. Below these spaces the operator explains the reason for stops, if any. On the reverse side of the envelope are spaces to be filled in by the operator for work other than machine operation. These reports are mailed to the Engineer's office where they are checked by the clerk who determines the operator's and equipment time from the information as reported. The lower half of the reverse side of the envelope is reserved for the clerk's summary.

Distributing the Costs

The same clerk who summarizes the daily reports handles all other accounting in the County Highway Department office. The charges to the different roads on the monthly reports is determined by taking the monthly record of hours worked for each machine on each road, totaling them, and then dividing the actual costs charged against the machine for that month by the actual hours worked, to get the hourly charge for that month. Then, by multiplying this by the number of hours worked on each road, the cost charge to that road is determined. These monthly reports are in the form of ledger sheets, one for each laborer and one for each piece of equipment. The annual report prepared by the County Highway Engineer is re-

(*Continued on page* 24)

C. & E. M. Photo

The Norman County Central Garage at Ada, Minnesota.

C. & E. M. Photo

Orville A. Hunt, County Highway Engineer for Norman County, Minn.

A perfectly logical step

. . . from TEXACO-paved Highways . . . to TEXACO-paved Airport Runways

1. Constructing Texaco Asphalt Wearing Surface on an Illinois highway.

2. Paving runway of a southwestern airport with Texaco Asphalt.

For 38 years, America's mileage of TEXACO-surfaced highways has multiplied steadily. Today, Texaco-paved highways are everywhere, from Yellowstone National Park in Wyoming to Miami Beach, Fla., including heavily-traveled State highways and lightly-traveled feeder roads.

From highways to airport runways was a perfectly logical step. With the development of aviation, speeded up by the war, there has been widespread use of TEXACO Asphalt products in the construction of airport runways, taxiways and other surfaces for military and civilian flying fields.

The resilience under impact, durability and low upkeep of TEXACO Asphalt construction furnish as satisfactory an answer to the airport runway problem, as they have for 38 years to the highway problem.

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Boston Philadelphia Richmond Chicago Jacksonville Houston

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THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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The War and Highways—Your Contribution and Ours

Today you build or not, depending on whether an Army or Navy officer nods or shakes his head. This has caused considerable concern among engineers closely associated with highway service, because they know that the delay in the reconstruction of thousands of miles of heavy-war-traffic roads will mean a complete break-up of many old bases. There must be a carefully considered release of materials, machinery and money within a reasonable time so that highway transportation for food, materials, munitions and troops will not bog down at the bottlenecks created by tardy reconstruction. The reduction in the use of bituminous products along the eastern seaboard following the April 24 "freezing order" of the Petroleum Coordinator will necessarily reduce annual maintenance operations and thereby hasten the day when reconstruction will be required on many miles of highways in these states.

When will that day come when we can release the needed materials for an adequate highway reconstruction program that will aid and not retard the Victory program? When will the Army and Navy head-shaking change to the affirmative nod?

The United States is embarked on a wartime construction and manufacturing program so vast that it beggars description. We must complete the work already started on air fields and bases, camps and training centers, manufacturing plants for fighter planes and bombers, munitions and synthetic rubber, using vast quantities of basic construction materials. The construction industry has shown itself equal to the demands of these vast projects by completing every project faster than anticipated.

It is reasonable to anticipate that these great programs with their demands for construction materials will have reached fruition in 1943, releasing a sufficient, though exceedingly small, fraction of our increasing production of steel for needed reconstruction in our highway system.

By the spring of 1944 our great highway transportation system will have been through the hazards of two more periods of winter and spring freezings and thawings and two full years of heavier freight and military traffic, with their consequent damage to the road structure, under restricted maintenance. Thus, not later than the spring of 1944, we shall see the mandatory reconstruction of thousands of miles of highways which today do not get the nod of approval from Army or Navy for reconstruction.

This situation is not the fault of our military men. Their imperative need is the equipment with which to wage a successful war outside the United States and bring it to an end in the shortest possible time, with total defeat of the enemies of freedom and democracy. Today our highways are serving the armed forces adequately, except where there is a dearth of transportation facilities at new camps and bases, or at new or expanding manufacturing plants. Money and materials released for highway construction now amount to less than a trickle, but they will flow, and flow freely, when there comes a slackening in the pace of other, at present more vital, construction and when there is any failure of our vast highway network in its service to the needs of the Victory program.

For this reason, no one can afford to slacken his preparation for an active and aggressive part in the eventual, and not too distant, program of highway reconstruction. Our citizens must realize the importance of supporting, through their congressmen, a continuance of the established rational system of Federal Aid for highway construction which has given us the best coordinated highway system in the world, held to the best design and methods of construction by the guidance, counsel and leadership of the Public Roads Administration.

Our state and county highway organizations, even though stripped of man power by the military services and the demands of wartime construction, must bend every effort to see that the plans and specifications are ready for every foot of reconstruction that will be required for maximum efficiency in the war effort, and that new right-of-way is acquired now so that delays will be eliminated later. They must put into

(*Concluded on page 47*)

Construction Equipment Sales Now Restricted

The fulfillment of requirements for the prosecution of the war has created such a shortage in the supply of rubber and other materials used in the production of construction equipment that, in the public interest and to promote the national defense, Limitation Orders No. L-82 and L-82-a have been issued by the Division of Industry Operations, War Production Board.

Order No. L-82 prohibits any manufacturer, dealer or other authorized channel of distribution of power shovels and cranes from selling, leasing, trading, or transferring any unused power crane or shovel, unless such a transaction has been specifically released from the operation of this order by the Director of Industry Operations upon application to him, setting forth facts which satisfy him that such power shovel or crane will serve the war effort or essential civilian needs. After June 1, no power shovels or cranes may be bought or sold without specific permission of the War Production Board, and also after that date no manufacturer shall produce any power shovels or cranes except in accordance with such production schedules as may be specifically approved from time to time by the Director of Industry Operations.

Order No. L-82-a sets up similar restrictions on the sale, lease or transfer of unused rubber-tired construction equipment, such equipment including the entire range of machines and equipment which heretofore have been mounted on rubber tires, and also prohibits the production of any rubber-tired construction equipment except in accordance with a production schedule filed with the War Production Board.

Any person affected by these Orders who considers that compliance with them will work an exceptional and unreasonable hardship upon him or that they will result in a serious problem of unemployment in the community may apply for relief by addressing a letter setting forth the pertinent facts and reasons for relief to the Director of Industry Operations, War Production Board, Washington, D. C.

Slope Stabilization Can Be Inexpensive

In the introduction to an excellent discussion of "The Naturalization of Road Banks," C. R. Hursh, Senior Forest Ecologist, Appalachian Forest Experiment Station, Forest Service, U.S. Department of Agriculture, points out that the cost of road-bank stabilization can be relatively low if the method followed is to leave the bank in such shape as to favor the gradual invasion of local vegetation. So small is this cost in its relation to the cost of road construction that it is almost inexcusable to permit the wounds and scars that disfigure so many of our highways today. In addition to the inestimable gain in aesthetic values, the naturalized road bank has a very practical and utilitarian value, determinable in dollars of maintenance costs per mile of roadway saved.

Eroded soil from bare banks on many mountain roads in the southern Appalachians, by choking ditches and culverts and subsequently cutting out fills, has cost each year $100 to $300 per mile of roadway in maintenance. Where vegetation finally has pushed its way onto these bare banks, halting erosion of the remaining soil cover, maintenance costs have fallen to a small fraction of the former avoidable expense. Many hidden costs, too, are chargeable to bare road banks. These mount high in silted reservoirs, clogged streams, and ruined adjacent arable lands. Slips of the bank surface, smearing clay and mud across the highway, cause serious accidents.

On Federal lands naturalization of road banks has already proved its economic worth and aesthetic value in solving many difficult problems of road construction, attracting the attention of roadway engineers throughout the country, and arousing much public interest.

We heartily recommend the text referred to, Technical Note No. 51, for its discussion of various types of treatments, including new techniques in road-bank naturalization. A limited number of copies are still available and may be secured from the Appalachian Forest Experiment Station, Asheville, N. C.

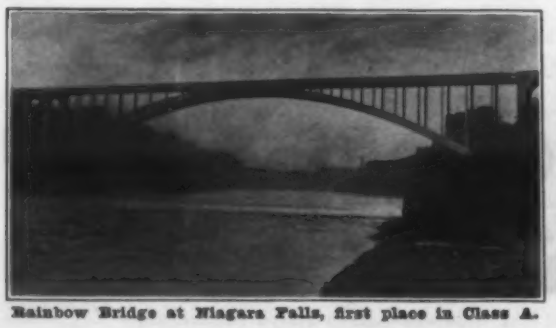
"Hey, Gus! When I said to step up your yardage, I meant digging—not golf!"

Do your share in the fight for freedom. Buy U.S. War Bonds and Stamps.

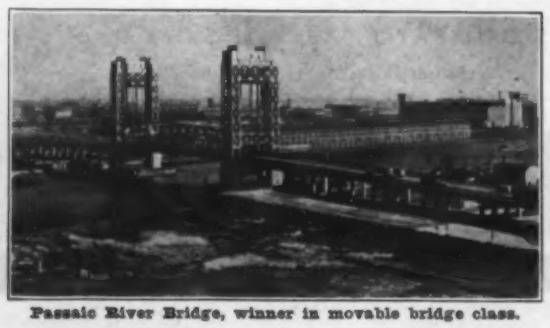
AWARD-WINNING STEEL BRIDGES
See page 51.

Fairmount Boulevard Bridge.

Wabash Railroad Subway Bridge.



Rainbow Bridge at Niagara Falls, first place in Class A.



Passaic River Bridge, winner in movable bridge class.

Bridge over St. John's River, Jacksonville, Fla.

Die Cast Weld Metal For Repairing Parts

In these days of conservation of critical materials, it is essential that every equipment owner make his present equipment serve for as long as possible. One way of keeping that equipment operating efficiently is by regular inspection and immediate repair of worn or broken parts.

Universal die cast white metal and aluminum welding rods are particularly designed for this type of work. The former may be used for welding thin die castings, carburetors, magneto frames, cylinder heads, crankcases, manifolds and similar service, while the aluminum rods are for use on sheet aluminum or aluminum castings.

New leaflets on these Universal welding rods, containing directions for their use, may be secured by those interested direct from the Universal Power Corp., 4300-2 Euclid Ave., Cleveland, Ohio.

Timber Construction Increasing in Northwest

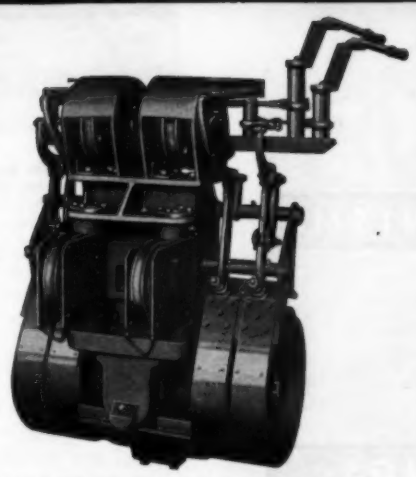
Announcement has been made by the Timber Engineering Co., Washington, D. C., of the opening of a branch office in the Yeon Building, Portland, Ore. The establishment of this office has been required by the increased building because of the war effort and the growing need for technical information on the use of timber in construction. The new branch will assist distributors and timber fabricators in the Northwest in their promotion of timber construction, render technical advisory service, maintain additional stocks of Teco products, cooperate with the West Coast Lumbermen's Association and the Western Pine Association in lumber promotion activities, and work with engineering students and practising engineers.

The Teco system of timber construction, developed by Timber Engineering Co., is based on the Teco timber connector which, by strengthening the joints, permits lighter timber members to do heavier work than formerly thought possible, it is stated.

The Portland office will be under the general direction of J. E. Mackie, Manager of the San Francisco office of the National Lumber Manufacturers Association, with Alden K. Smith, formerly Assistant Technical Director of the National Lumber Manufacturers Association, in direct charge.

Ellzey Brown in Army

W. Ellzey Brown, Vice President and General Sales Manager of the Cleveland Tractor Co., has been granted an indefinite leave of absence for active duty as a Major in the United States Army. Major Brown, who has been associated with The Cleveland Tractor Co. for the past three years, will be stationed at the Ordnance Training Center, Aberdeen Proving Grounds, Aberdeen, Md. At present, no arrangements have been made for anyone to take over Mr. Brown's duties with Cletrac during his absence.



Model HD (Heavy Duty) Power Control Units —Single or double drum—for all larger model tractors.

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Model MD (Medium Duty) Power Control Units—Single or double drum, recommended for all medium and small size tractors.

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YOUR tractors are only as fast as the dozers you put on them. Sluggish dozer action puts a heavy penalty on your machines, robs you of the output they're built to deliver.

That's why so many contractors are turning to Buckeye cable control. Buckeye Power Control Units are lightning-fast—they'll keep pace with your tractors. Fingertip control gives instantaneous blade action with all the power you can use for lifting and crowding. All functions of dozer operation are coordinated smoothly and rapidly, whether on grading, backfilling, excavating or bulldozing.

It will pay you well to investigate the advantages of Buckeye Cable Control for operating Bulldozers, Trailbuilders, Scrapers, Rippers, and for a dozen and one other jobs.

Write to Buckeye today.

Built by **Buckeye**

Quarry drills which have become too short for use, because of frequent resharpening, can be reclaimed economically by welding. Each new drill, shown on the left ready for welding, is formed of two short drills, shown at right.

New Quarry Drills From Worn-Out Steel

The life of drill steel is comparatively short because of the frequency with which it is resharpened and also due to breakage in operation. Oxy-acetylene welding, however, makes it possible to reclaim drills that are no longer of sufficient length to be serviceable by joining two short drills to make one long one. The resulting reduction in scrap losses is of particular value today because of the present great demand for high-carbon drill steel. In addition, oxy-acetylene welding offers a convenient means of making extra-long drills from standard drill lengths.

At the quarry where the welding procedure was first developed, most of the work is on jackhammer drills and wagon quarry drills, either hexagonal in section, 7/8-inch wide, or round and 1¼-inch in diameter. Some of the 400 drills which maintenance men at this quarry expect to salvage each year by this method are shown in the illustration.

The first step is to take two similar drills that are too short for use and cut off the shank from one and the drill end from the other. The two long sections that remain, one with a drill end and the other with a shank, can then be joined to form a complete drill of the desired length. The joint is prepared for welding by machining each cut end to a bevel of 35 degrees. The two sections are then lined up on a 2-inch angle iron, which is supported by V-blocks. Use of the angle iron permits easy alignment of drills of various diameters. The edges of the joint are spaced about 1/16-inch apart.

A small continuous tack-weld is then made at the base of the V, completely around the joint, while a helper turns the drill sections. The weld area is preheated for a distance of 2 to 3 inches back on either side of the joint, so that during actual welding the weld will not cool too rapidly through dissipation of heat into cold surrounding metal. The main weld is then made, with care taken to obtain good penetration with the initial tack-weld and with the side walls of the joint, which should be melted down about 1/16 inch. At the same time care should be taken to avoid overheating the metal, which would be indicated by sparks.

As soon as the weld has been made and before it has had a chance to cool, the drill is removed from the angle-iron support, checked for straightness, and replaced in the angle-iron. The area on either side of the weld is then reheated to assure the slow cooling necessary to achieve a ductile, shock-resistant weld. An Oxweld W-17 blow-pipe and neutral oxy-acetylene flame are used in the heating and welding operations, and the weld is made with Oxweld No. 1 High Test Rod.

We wish to credit *Oxy-Acetylene Tips*, New York City, for this information and for the illustration.

Pavement Breaker Machines

Rapid pavement breaker machines for both inside and outside work are the subject of a bulletin recently issued by the manufacturer, the Rapid Pavement Breaker Corp., 607 Degraw St., Brooklyn, N.Y. The Junior breaker delivers seventy 10,000 foot-pound blows per minute and can be used for all types of concrete demolition on roads, trenches, concrete floors, for breaking frozen ground or slag, and for stripping concrete-encased beams. It is available in two models, the Type P push-around model and the Type M air-motor-driven unit, and can be operated by any 210-cubic foot compressor.

The illustrated bulletin describing both models in detail may be obtained by writing direct to the manufacturer.

VIBER COMPANY CONCRETE

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REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 18 inches thick, foundations, large girders thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

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ENGINES STAY 3 Times Cleaner INSIDE

Truck fleet of the Standard Roofing and Material Co., Tulsa, Okla. This company's equipment has been Texaco fueled and lubricated throughout . . . for 15 years.

THEY PREFER TEXACO

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

FOR YOUR ENJOYMENT

FRED ALLEN every Sunday night. See your local newspaper for time and station.

THOUSANDS of extra miles of wartime service can be yours, beginning now, when your high-speed Diesels and heavy-duty gasoline engines are lubricated with *Texaco Ursa Oil X★★*.

Texaco Ursa Oil X★★ keeps engines 3 times cleaner than ordinary oils. Deposit-forming materials are held in suspension so that they are drained at regular oil-change periods. Oil lines, oil ways and filters stay clean.

High in E.P. characteristics, *Texaco Ursa Oil X★★* makes heavy-duty engines last longer; protects modern bearings.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can also be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

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New England Carries On Despite Freezing Order

Tar and Asphalt Will Be Used in Lesser Degree, But Spring Maintenance Had Started in Most States

+ THE bituminous freezing order of April 24, 1942, came as a blow to the Atlantic seaboard states, particularly the New England area with its shorter period of highway activity. Personal interviews with the heads of New England highway departments indicated a condition of preparedness which made it possible to take advantage of the fifteen days of grace up to May 9. In general, contracts had been awarded for the same or a slightly greater volume of bituminous material for maintenance than in previous years, because construction was lagging due to reduced gas-tax income.

Release of tar and asphalt available in storage where its distribution would not create a burden on rail transportation now has greatly relieved the situation in most areas where the order was effective. These include the New England states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut, the middle Atlantic states of New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia and the District of Columbia, and the southern states of North and South Carolina, Georgia and Florida east of the Appalachicola River.

The following interviews outline the normal maintenance procedure for different types of roads in the New England states, with brief statements on the effect of the reduction in bituminous materials available for this work in the future.

Maine

At the very time that the bituminous freezing order of the Petroleum Coordinator was received on April 30, Lucius D. Barrows, Chief Engineer, and J. B. Church, Superintendent of Maintenance, Maine State Highway Commission, were preparing to start the spring maintenance program involving the surface treatment of a large mileage of gravel roads with the 8,000,000 gallons of tar already under contract.

Mr. Barrows stated during our interview that the frequency of re-treatments on surface-treated gravel roads varies considerably. Well-constructed sections may not require a treatment for three or four years after the second treatment. Other sections which were constructed a number of years ago may require annual treatments. In general, it is necessary to re-treat 60 to 70 per cent of the total mileage of this type of surface each year. The rate of application for a re-treatment varies from 1,400 gallons to 2,400 gallons per mile of 18-foot road, depending on the condition. The lighter applications are for seal coats only. Quantities above 1,800 gallons to the mile are mulched, the amount of cover material varying with the quantity of bituminous material applied. Approximately 50 yards per mile is required for a treatment of 1,400 gallons and 100 cubic yards per mile for 2,400 gallons. The greater portion of the cover is placed in piles along the road, although where there is a scarcity of labor the material is hauled directly from pits to the treatment and applied by mechanical sand spreaders. All cover material is screened through a portable 1¼-inch mesh screen.

During the past year about 8 miles of shoulders adjacent to concrete pavement were surface-treated with RT-5. Previous to that, about 2.5 miles of this type of work was done and 8 miles was done with Durfee mix, all on concrete highways.

Under the present restrictions, tank-car shipments would be required only to the extreme northern portion of the state, the balance being delivered by distributors and ferry trucks. Of the total mileage of the surface-treated gravel

(*Continued on page 30*)

C. & E. M. Photo

The type of hydraulically controlled Burch Undr-Trak maintainers used to mix the annual maintenance surface treatment of tar and sand in District 8 in New Hampshire.

Contractors today are faced with a new problem. Where formerly new equipment and most spare parts could be obtained on relatively short notice, now the needs of war sometimes cause delivery delays and even shortages.

Let's face the facts—we're all willing to sacrifice if it will help our victory efforts. For many owners of older Lorain equipment, it means making your present equipment last longer and getting the *most* out of what you've got.

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- In many cases your distributor maintains a representative stock of genuine Thew-Lorain spare parts and can give you quicker service on deliveries because he knows *what you need* and *how to get it* if he doesn't have it in stock.
- He is equipped in most cases to provide quick service *in the field*, and at his shop he maintains complete facilities where the toughest repair jobs can be handled.
- He *knows* Thew-Lorain equipment thoroughly—employs service men who are experienced in repair and maintenance work on Lorain shovels and cranes. He can help you plan your jobs so that your equipment will deliver the greatest work in the shortest time.
- He may be able to supply information on rentable equipment or booms that you may need for converting present machines.

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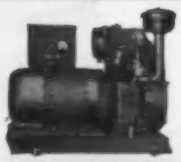

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New Dual Highways In South Carolina

A New 10-Mile Stretch of U. S. 52 in Pee Dee Section Has an 18-foot Parkway

✦ THE State Highway Department of South Carolina has recently completed a dual-lane highway between Darlington and Florence in the northeastern or Pee Dee section of the state. This new 10-mile section of U. S. 52 consists of two 22-foot lanes of pavement separated by an 18-foot grass parkway merging into 50-foot streets, with sidewalks, within the city limits of Darlington and Florence. The 18-foot parkway between the two pavement lanes serves to separate opposing traffic, thus preventing head-on collisions, and secondly the parkway serves to enhance the aesthetic features of the highway, making it attractive as well as traffic-worthy.

The Old Pavement

The original pavement on this route, constructed in 1925, was an 18-foot asphaltic-concrete surface course on a cement-concrete base. The old pavement had become badly cracked and was in a very rough condition, in addition to being too narrow for the volume of traffic now using road, the traffic having increased from 576 vehicles per day in 1925 when the first pavement was constructed to a total of 2,417 in 1940. One of the major problems in this project was to utilize the old pavement to the best advantage, according to Claude R. McMillan, State Highway Engineer. In designing the new road project, several methods of procedure were studied carefully and it was finally decided to widen and resurface the old pavement slab for one of the traffic lanes and to construct an entirely new pavement slab for the other lane.

The Resurfaced Lane

The resurfacing feature of the project is somewhat unique in design and method of construction in that it is the first time in South Carolina that a bituminous pavement has been resurfaced with portland-cement concrete. This concrete top has a minimum thickness of 5 inches where the new work is entirely supported by the old bituminous pavement, but beyond the edges of the old pavement the thickness is 7 to 8 inches, the 8-inch depth being on the outside edge of the slab to insure sufficient strength.

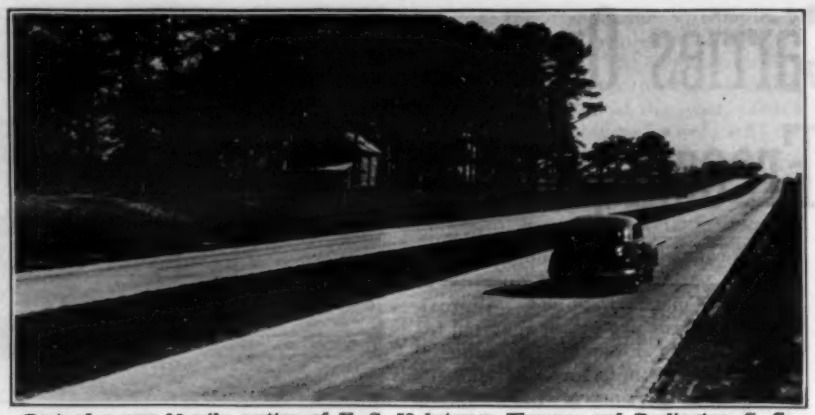
To provide for uniform expansion in both the old and new pavements, openings were made across the old pavement the same distance apart as specified for openings in the new surface and spaced so as to be directly under the joints in the new pavement. These openings were repacked with regular expansion-joint material. This design makes it possible for the old and new pavement to act as a unit and secure the maximum support from the old pavement. In constructing the new pavement, there was no attempt to bond the new concrete to the surfacing of the old pavement.

The New Lane

The other lane is an entirely new concrete pavement, conforming to the standard South Carolina design of 22 feet wide and 8 inches thick at the edges, tapering to 6½ inches uniform thickness 3 feet from the edges.

Within the limits of the two cities, the center parkway was eliminated because it was impractical to use the divided-lane pavement except at prohibitive cost for rights-of-way and at great inconvenience to the adjoining property owners.

The new lane was constructed first so that it could be used by traffic during the resurfacing of the old pavement. This procedure reduced to a minimum any interference with traffic during the reconstruction of the project.



Part of a new 10-mile section of U. S. 52 between Florence and Darlington, S. C.

The sand used on the project was obtained from a local pit approximately 2 miles east of the project. The crushed stone was shipped from a quarry at Rion, S. C., and the cement was obtained from mills located out of the state.

Personnel

The entire project was constructed by William F. Bowe of Augusta, Ga., in 162 working days. The project was directed by C. R. McMillan, State Highway Engineer, and was under the immediate supervision of H. L. Sligh, District Engineer, and H. N. Heckle, Assistant District Engineer at Florence, S. C., with C. W. Milling as Resident Engineer.

Portable Concrete Plant

The Strayer portable concrete plant makes on-the-spot concrete to specifications, according to the manufacturer, the Erie Steel Construction Co., Erie, Penn. It is available in three sizes, ½, ¾ and 1-yard, and is one-man controlled, exclusive of cement handling. It is reported that it can move onto the job and pour concrete in less than one hour, and make ready for travel to the next job in thirty minutes.

A folder recently issued graphically presents operating features of this unit and lists results obtained by several users. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

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Reflector Signs Designed For Emergency Problems

The traffic emergency caused by the shortage of steel for street and road signs, and the fact that in an increasing number of areas occasional or regular blackout regulations are in force, is being handled in many localities by the use of luminous and reflectorized traffic and direction signs and road markers.

Such signs, of any type of wood, metal or other material, may be made up in state and county sign shops, or by local workmen, using Star-Lite Reflecto-Chain, which consists of a series of reflectors mounted in a flexible chain which is easily bent or curved to form any letter, figure or symbol. It is obtainable in various sizes and colors of reflectors, and in any desired length. In addition to picking up and reflecting even dim lights at a considerable distance, Reflecto-Chain can also be furnished in a special luminous finish which makes the sign visible at short distances even in total darkness. The reflectors may also be equipped with a special screen for making them invisible from overhead.

Descriptive literature on Star-Lite Reflecto-Chain and its uses may be secured by interested engineers and contractors direct from the Star-Lite Co., 312 East Market St., Indianapolis, Ind., by mentioning this item.

C. & E. M. Photos

The long slope down which the loads were hauled from the south end of the big cut on the Eau Claire, Wis., by-pass and, above, a closer view of the Koehring 303 loading one of the fleet of seven 5-yard trucks.

Eau Claire By-Pass Has Huge Long Cut

Dirt Went Three Ways from 1,700-Foot Cut Taken Out by Two Contractors for Long Fill and Bridge Approach

(*Photo on page 56*)

✦ THE new Belt Line Highway, U. S. 12, around Eau Claire, Wis., included a new steel bridge (C. & E. M., May, 1942, page 11), a street separation and 7.34 miles of grading. The grading was featured by a single large cut of 242,159 cubic yards of earth and 34,531 cubic yards of rock in 1,700 feet, with a maximum depth of 59 feet. The contract for grading and roadside treatment was awarded to Isaac S. Ofstie, of Menomonie, Wis., on his low bid of $223,939.79.

The big cut was divided, Ofstie moving 79,338 cubic yards of earth for a 2,400-foot fill north of the cut, using one 12-yard and two 15-yard LeTourneau Carryall scrapers pulled by RD8 tractors, and a ¾-yard Lima shovel loading to five Oshkosh 6-yard dump trucks.

All of the material moved out of the cut to the south was done under subcontract by L. G. Arnold, Inc., of Eau Claire, Wis. With an average haul of ½ mile, Arnold moved 162,821 cubic yards of earth and 34,531 cubic yards of rock from this cut, most of it down very steep grades, to the north approach fill of the new Chippewa River Bridge, an important link in this urban by-pass. Even this does not account for all of the cut, as 81,461 cubic yards was wasted on low land near the bridge, with about the same haul as the approach fill.

Such rock as was met in the cut was broken up with a K-30 LeTourneau rooter and Caterpillar RD8 tractor. A Koehring 303 shovel was used in the cut for loading a fleet of seven trucks which made the 1-mile round-trip haul to the bridge approach. The trucks, hauling 4 or 5 cubic yards of earth, made seventy round trips per day per truck, operating 14 hours divided into two shifts.

The Eau Claire Belt Line Highway was built under the direction of the Wisconsin State Highway Commission, with E. F. Linster as Resident Engineer.

More Interest in Timber

With the necessity of using timber to replace steel in many buildings and bridges, many construction engineers are going back to school these spring evenings to learn more about timber engineering. Men with specialized experience in the newly developed techniques of engineering in timber, developed by the growing acceptance of the Teco connector system of timber construction, are acting as instructors.

The giving of courses is the idea of two members of the West Coast Lumbermen's Association, Chester Hogue and T. K. May, and J. B. Dodge of the Northwest Bolt & Nut Co. Nearly 40 engineers attended the first meeting at the U. S. Engineer Office, Seattle, and between 40 and 50 engineers from the Siems Drake Spokane Co., the Puget Sound Bridge & Dredging Co., and the Associated Shipbuilders attended the second night-school session. The engineering Department of the Puget Sound Navy Yard received an invitation to hold a similar meeting.

At all of these meetings a question box is set up so that those attending can drop written queries into it to be discussed at meetings. The system is working out exceptionally well, according to Mr. Dodge, and the classes are planned to continue indefinitely.

BY CENSOR

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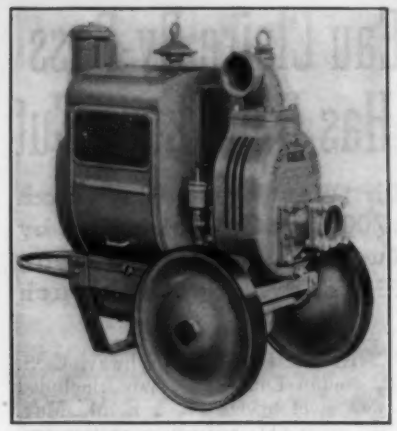


The new Rex 4-inch self-priming pump.

New 4-Inch Model Of Self-Prime Pump

A new model 4-inch self-priming pump with a capacity of 30,000 gph powered by a 10 to 12-hp air-cooled engine has been announced by Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. This pump is designed for dependable low-cost service and has the patented Rex Z-Metal air peeler which removes the air from the surface of the impeller when the pump is primed or when it is actually pumping. This pump also uses Rex Z-metal for the impeller and alloy steel volute liners to reduce wear.

Complete information, including the price of this pump, may be secured direct from the manufacturer by mentioning this item.

New Highway Mower With Double Sickle

The advantage of a double sickle in a highway mower, according to Lull Mfg. Co., 3520 E. 43rd St., Minneapolis, Minn., is that it eliminates vibration, doubles the cutting capacity without increasing the sickle speed and makes it possible to cut brush readily because one sickle section cuts against another like a pruning shear instead of against a blunt guard.

The American Clipper mower, powered by a Minneapolis-Moline tractor, is hydraulically controlled by two short levers conveniently located for the operator. An hydraulic pump operates off the camshaft of the engine giving independent sickle control without using the clutch. The mower cuts from a vertical position to a 50-degree angle below a level plane without loss of efficiency. Further, it is possible to make a level cut over a 12-inch curb.

Other features of the American Clipper mower, including the elimination of pitmans, universal joints and ball pivots, are described in detail with complete specifications in a four-page folder which may be secured direct from the manufacturer by referring to this descriptive text.

Mop Wringers and Tanks

Circulars giving full details and prices on the Geerpres mop wringer, which it is claimed reduces mop costs from 25 to 50 per cent, may be secured by those interested direct from Geerpres Wringer, Inc., P. O. Box 152, Muskegon, Mich. The circulars state that the use of these wringers leaves the mop fabric in a soft fluffy condition conducive to rapid mopping. Made in two sizes, these Geerpres wringers are available with or without tanks.

Piles Drive Faster With Steel Shoes

Economy in driving both wood and pre-cast concrete piles can be insured by equipping them with steel pile shoes. American all-steel pile shoes made by The American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa., are designed to insure rapid penetration and maximum depths with fewer blows. The shoes for wood piles have nail holes to provide for speedy, permanent application and a "bending" hole permits a tailor-made fit to the sides of slightly smaller piles. The sides of these shoes are made of two ¼-inch steel shapes assembled by heavy welding, using coated wire. The sharpened point is made from solid steel bar stock. The shoes are made in three sizes for 6 to 9-inch, 8 to 11-inch, and 10 to 14-inch diameter pile tips.

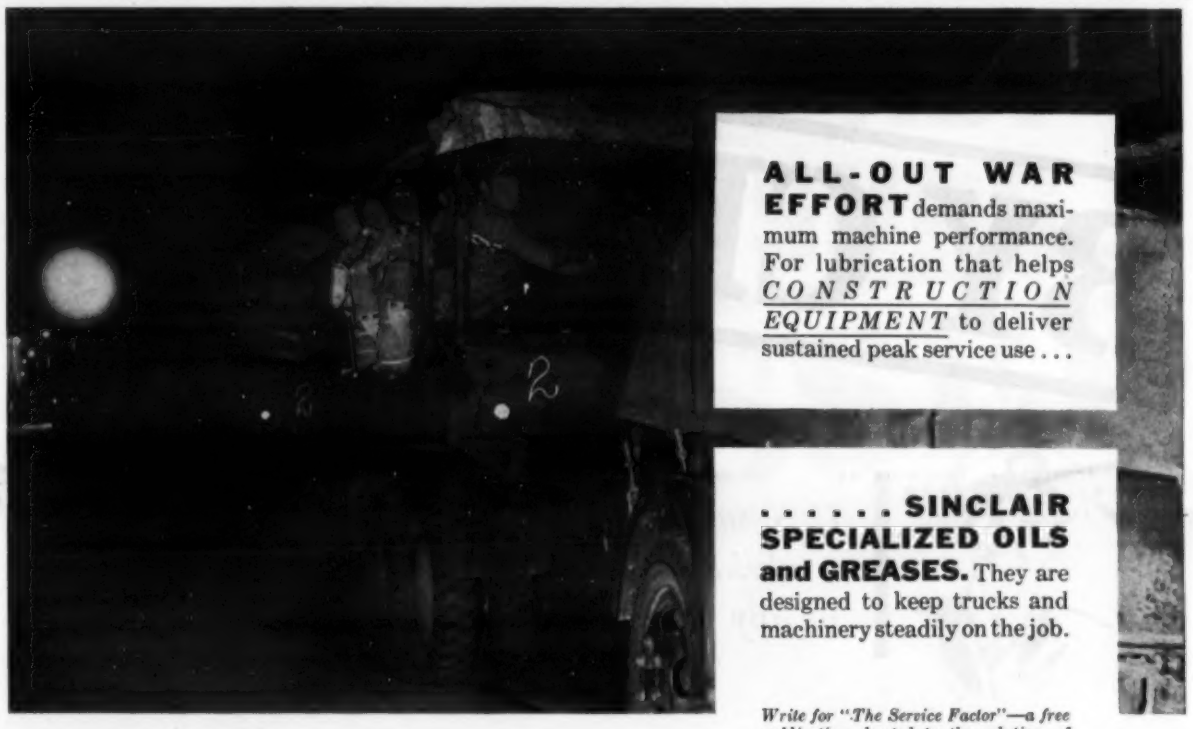
The pile shoe for pre-cast concrete piles is cast with the pile, becoming an integral part of it. A reinforcing bar, welded to the shoe, forms the point and also acts as an anchor to keep the shoe permanently in position. The base of the pyramid of the pre-cast concrete pile shoe is 7 inches square.

Complete information and prices will be found in Bulletin PS-38 which will be furnished on request by the manufacturer to those mentioning this descriptive text.

Heavy-Duty Jaw Crushers

Primary crushers in sizes 15 x 28 and 15 x 38 inches are described in Bulletin 116 of Alloy Steel & Metals Co., 1862 E. 55th Street, Los Angeles, Calif. The entire design of these jaw crushers is predicated on a minimum of parts and ease of replacement. They are of heavily reinforced all-steel construction, manganese-steel-equipped and with plain bronze bearings.

Bulletin No. 116A describes the Flood lubrication system used in these Pacific jaw crushers. Both of these bulletins will be sent to readers promptly upon application to the manufacturer.


ALL-OUT WAR EFFORT demands maximum machine performance. For lubrication that helps CONSTRUCTION EQUIPMENT to deliver sustained peak service use . . .
. . . . . SINCLAIR SPECIALIZED OILS and GREASES. They are designed to keep trucks and machinery steadily on the job.
Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

"CATERPILLAR" DIESEL D7 Tractor, part of Heldenfels Bros. (Rockport, Tex.) equipment on 260,000 cu. yd. job. Sinclair lubricants used.

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Whenever there is mixed-in-place construction such as soil-cement, bituminous, etc.

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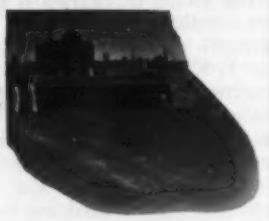

It operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of Aggmixer tines does a thorough job of mixing—wet or dry. Send for job facts now.

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Problems Overcome On Michigan Bridge

Substructure for Bridge Poured on Steep Bank of Sandy Gorge Near Epoufette By W. J. Meagher of Bay City

(*Photos on page 56*)

✦ THE manner of handling the construction of the two abutments and two piers for the 641-foot cantilever bridge over the Cut River on U.S. 2 near Epoufette in the Upper Peninsula of Michigan by W. J. Meagher & Sons of Bay City, Mich., offers an interesting study to contractors faced with similar problems. The contract was awarded by the Michigan State Highway Department on Meagher's bid of $108,793.06 for the substructure of the new high-level bridge, which measures 550 feet between pins, and has a main span of 300 feet, the center 50 feet of which is suspended between the two 125-foot cantilevers which balance the two 125-foot anchor spans. The roadway is 150 feet above the Cut River, which runs through a sandy gorge at this point into Lake Michigan. The bridge runs approximately east and west on a new location of U.S. 2, with the lake to the immediate south of the structure.

Grading for Abutments

Instead of using an approach span or trestle for the west end of the bridge, a large fill requiring 40,000 cubic yards of borrow and 70,000 cubic yards of material from the ¾ mile of road grading was put in. This 110,000-cubic yard fill was made with a 1½ to 1 side slope and a 2 to 1 front slope. This work was all done by the subcontractor on grading, using Caterpillar RD8 tractors pulling 18-yard LeTourneau Carryalls, with an RD8 used as a pusher in loading.

The east abutment required no special grading operation.

Pier Excavation

The east pier is located approximately one-half-way down the steep bank, making it very difficult to operate machinery for the excavation of the pier and also impossible to sheet around the pier. In order to prepare a working area at the pier site, a Caterpiller RD7 with a LeTourneau bulldozer worked down the east bank, trimming the slope to the specified 2 to 1, and pushed the dirt ahead to form the working area. Then a Northwest crane was walked in from the west side over a work road which was cut along the slope and up to the working area by the tractor. The tractor was also used to push the crane up the steep grade on to the work area. Inasmuch as sheeting would not hold in this loose fill, the footing excavation proceeded with no sheeting and the dirt was allowed to slide in from the back and was moved to the slope below by the crane and an Owen 1-yard clamshell bucket. This made it necessary to move the dirt back and tamp it to reform the specified slope behind the pier after it was completed.

Steel sheet piling was used to form a cofferdam around the excavation for the west pier, because a natural shelf of solid ground extended out in front of the pier so that the cross-bracing within the cofferdam would hold satisfactorily and not push out the front of the cofferdam, as would have been the case on the east pier had sheet piling been used.

Piles and Pile Driving

All four footings are carried on Union fluted metal piles filled with concrete and reinforced with four 1-inch rolled deformed bars per pile, placed 3 inches from the outside edge of the shell. There are 105 piles in the foundation for each pier, and 46 in each abutment. The front piles in each structure were battered 5 inches in 12, and the remainder of the outside piles 4 inches in 12. The piles used were Union Type G fluted shells having 16¼ and 16¾-inch butts with 8-inch diameter tips and steel points. The original plans called for piles with 33-foot tapered end sections, to which 10, 20 and 30-foot extensions were to be welded as required to produce the desired length. The specifications provided that the piles be driven to 40-ton bearing capacity. The pile driving was done by a Northwest crane swinging a Vulcan No. 2 hammer and 50-foot leads. A 35-hp vertical steam boiler was used to provide power for the steam hammer.

The work of driving the piles was started at the site of the east pier. At this unit there was a 22-foot layer of fine yellow sand beneath the footing. Below this was a 4-foot layer of compact clay gravel and then fine yellow sand. The soil beneath the other units was similar, except that the layer of clay gravel did not exist. In driving, the specified bearing capacity was obtained

(*Continued on page 44*)

C. & E. M. Photo
Driving steel sheet piling for the west pier cofferdam.

NEW H-S PORTABLE ABRASIVE CORE DRILL

For heavy drilling of reinforced concrete—taking test cores in concrete highway construction and floor slabs. Drills holes

3½" to 6½" dia. Smaller models down to ½" diameter. Gasoline or electric power. Write for descriptive circular.

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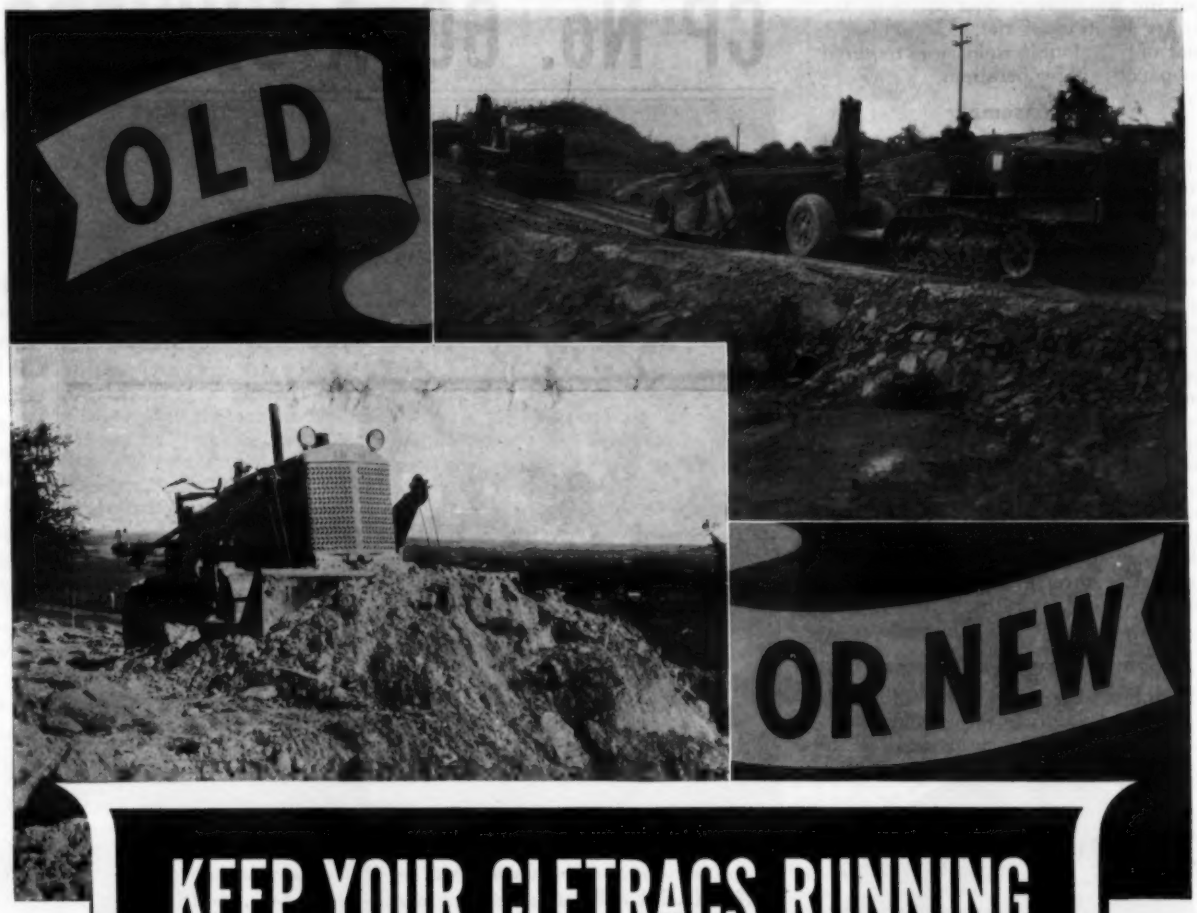

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CLETRAC CRAWLER TRACTORS—GASOLINE AND DIESEL

Assembly and Placing Of Trusses for Dock

(*Continued from page* 1)

carried on a wall crane. When the panel with the corrugated metal sheeting laid on was rolled into the welding shed, a crew of four men, consisting of a welder, helper and two laborers, started the spot welding process. The welding machines operated at 440 volts and 400 amperes and had air-operated pistons for the two holding points which pressed the corrugated metal firmly to the structural steel members before welding. Following this the two electrodes were forced down by pneumatic pressure and the current turned on momentarily, making two spot welds simultaneously to hold the sheet metal firmly to the structural steel.

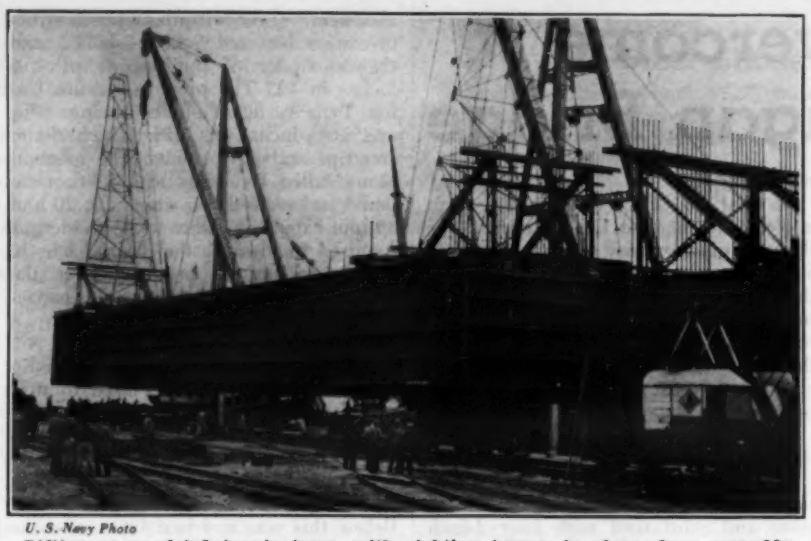
In preparation for the spot welding, a line was stretched from end to end of the panel along each longitudinal structural steel member and a chalk mark made on the raised corrugations of the sheet metal for the entire length of the panel. These chalk marks were used to spot the automatic welder to insure the proper location of the tack welds. A total of 770 double welds was required per panel in this operation.

Jig Assembly

The completed panel was then moved forward to a switchback and onto the intermediate single track to the head of the assembly yard. The welded panels were picked up by one of a group of three Manitowoc Speedcranes with 70-foot booms and hung in the assembly jig. The pair of assembly jigs were built up of heavy timbers and equipped with pivoted I-beam hangers from which each panel was suspended at four points. A steamboat ratchet jack operated each hanger so that the panel was held at a predetermined grade. Four screw jacks lined up the top of the panel and five ratchet jacks lined up the bottom. The three panels on each side were splice-welded to form a continuous side panel 191 feet long. The tremie truss, after this initial assembly, was lowered onto four railway trucks, two on each side on the double tracks.

Completion of Box Trusses

Each box truss was then moved ahead in three steps during which additional cross members, reinforcing and end wings were installed. These wings were equipped with spring gates which closed the space between adjacent trusses when released by divers under water after the tremie truss was in place. Brackets or outriggers of angle iron were welded inside and outside at the top of the truss to carry four longitudinal angles to which series of "hairpins" of deformed bars were welded vertically to tie in the top 2 feet of floor concrete to be placed at a later date in the dry on top of the tremie foundation concrete. The welding of the various parts of the truss at each station along the assembly line was done by certified Navy welders using a battery of some thirty Hobart, Westinghouse and General Electric portable and stationary welding units.



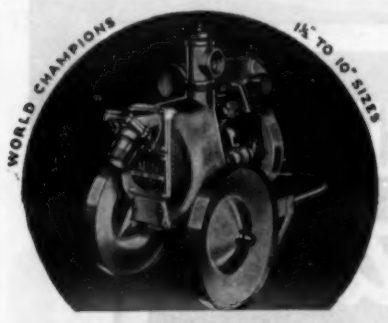
U. S. Navy Photo

Lifting a completed tremie truss, with sighting towers in place, from assembly trucks on to a carrying barge.

Lifting and Placing Trusses

A single tremie truss, weighing about 140 tons, is 191 feet long, 20 feet high and 14 feet wide. Upon completion at the end of the assembly line, the truss was picked up by the two rented Merritt-Chapman & Scott Corp. derrick barges, using slings attached to two pairs of lifting points 150 feet apart di-

(*Continued on next page*)



Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
- **LONG-LIFE SEAL** — Accessible for inspection.
- **PATENTED SELF-CLEANING SHELL.**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 240,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

CP No. 60, A UNIVERSAL DRIFTER

POPULAR 3½" MODEL ADAPTABLE TO WIDE VARIETY OF CONDITIONS

Well Balanced, Easy to Handle

NEW YORK—Popular model among the Chicago Pneumatic line of drifters—Hand-Crank, MOTORfeed and AUTOfeed—is the CP No. 60, a 3½" hand-crank drill. Because of its high drilling speed, low air consumption and ease of handling, the CP-60 is a favorite with contractors, mines and quarry operators. It is a particularly good drill for operations in which it is desirable to standardize on one size of medium weight drifter. Write for complete data on the fast-drilling Chicago Pneumatic No. 60.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 E. 44th St., New York, N. Y.

↑ **EQUALLY GOOD FOR HARD ROCK OR SOFT,** Chicago Pneumatic No. 60, 3½", 148 pound drifter, is ideal where conditions make it desirable to standardize on one size of medium-weight drill. Check the CP-60 under your conditions.

THOROUGH LUBRICATION of the entire drill from one oil chamber . . . front head of extra wall thickness and bushing to take up wear . . . these are only two of the features which contribute to the low maintenance of CP-60 Drifter. →

HIGHER DRILLING SPEED, lower air consumption per inch drilled, long life and continued efficiency of CP-60 Drifter are assured by an unusually light, fast and economical valve with short travel and large bearing areas. ↓

← **COMPARATIVE TESTS** in this Canadian mine demonstrated the fast drilling, low air-consumption and exceptionally low maintenance cost of the popular Chicago Pneumatic No. 60, the 3½" drifter that meets readily the requirement of general, all-around mining.

CHICAGO PNEUMATIC

ROCK DRILLS

ALSO: Air Compressors, Pneumatic Tools, Electric Tools, Diesel Engines, Hydraulic Aviation Accessories

DRIFTERS
MOTORdrifters
AUTOdrifters
SINKER DRILLS
WAGON DRILLS
DIAMOND CORE DRILLS

Assembly-Line Methods Speed Dry Dock Job

(*Continued from preceding page*)

rectly over the footings. The first move was to raise the truss clear of its supporting railroad trucks. Following this the outer end of the lashed derrick barges was pulled away from the bulkhead by a tug, while a second tug pushed in the barge which was to carry the truss. When the carrying barge, with its prepared cradles, had been pushed into position between the derrick barges and the bulkhead, the truss was lowered slowly onto the cradles. Before towing the barge and truss into the dry-dock area the barge was carefully trimmed.

Sighting towers about 75 feet high, built of welded tubing, were bolted in position at the two ends of the tremie truss prior to lowering it slowly onto the H-beam bearing piles in 70 feet of water. Completely surrounding the dry-dock area was a line of 12 x 12-inch timbers set accurately to grade on piles driven to an average penetration of 45 feet. Stations were measured on this timber for the location of transit heads, which were used to line up the tremie trusses transversely and longitudinally by means of sights on wires mounted on the end towers. These wires were sighted in by cross sights at right angles from the permanent base, which proved of inestimable value in saving time in handling the instruments.

Personnel

This Naval dry dock is being constructed by contract under the direction of the Bureau of Yards and Docks, U. S. Navy.

In the interest of national security, the location and mention of personnel connected with wartime construction will be omitted for the duration.

Asphalt Tank Trucks Use New Insulation

A record of saving fuel oil and gasoline consumption, tire wear, general maintenance costs and even license fees has been effected by Lansdell Co., highway contractor of Hackensack, N.J., through the installation of glass fiber insulation in ten of its fleet of fifty-six asphalt and tar tank trucks. The company decided to replace the original tank-truck insulation with Fiberglas thermal insulating wool because it wanted material that would not shake down under heavy vibration and would keep the tar or asphalt hot enough to pour on jobs requiring a haul as much as 200 miles.

Each truck is equipped with two heaters for use if reheating is necessary to maintain pouring temperatures of 275 degrees Fahrenheit for tar and 400 degrees for asphalt. The new insulation has resulted in a saving of approximately 8 gallons of fuel oil for each of the ten trucks on each long haul on which reheating was formerly required. The light weight and resiliency of the new insulation has made it possible to replace the former heavy metal sheathing required to keep the insulation in place with a light-weight steel sheathing that saves 500 pounds in truck weight.

The lighter-weight trucks pound less on the road, require fewer and less expensive repairs, and their useful life span has been increased. Tire wear and gasoline consumption have both been reduced. The decreased weight of the trucks has also effected a reduction in both New York and New Jersey truck license fees which are based on the weight of the vehicle. The reduction of 500 pounds in the weight of each of the re-insulated trucks saves Lansdell Co. license fee charges on 5,000 pounds, a saving which is repeated each year during the life of the trucks.

During this war-emergency period, with all of its demands on equipment, any measures calculated to reduce the necessity of replacements and decrease the drain on fuel oil and gasoline stocks are of importance. For this reason Lansdell is planning to re-insulate the remainder of its fleet of tank-trucks with Fiberglas, produced by Owens-Corning Fiberglas Corp., Toledo, Ohio, as quickly as the change-over can be made. Fuller information regarding this type of insulation may be secured from the producer by mentioning this item.

The Forty-Fifth Annual Meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon Hall in Atlantic City, N. J., June 22 through June 26. During the week, more than 150 meetings of technical committees will be held, and some eighteen official technical sessions are scheduled.

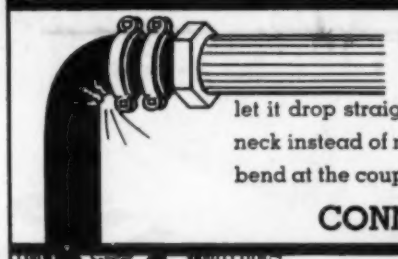
KEEP 'EM ROLLING
ON
EWC WHEELS
FOR ALL KINDS OF ROAD MACHINERY
FOR over half a century, dependable EWC Wheels and Axles have helped keep the job rolling along. Today, when efficient speed is more important than ever, you'll find our engineering experience at your service—ready to render valuable aid in maintaining your "rolling stock" at peak performance. Write for Illustrated Bulletins describing our service on Wheels, Axles, or Mountings. (Rubber-tired wheels available on direct War Orders.)
EWC WHEELS
Electric Wheel Co., Dept. CM, Quincy, Ill.

TIPS...ON HOW TO CONSERVE RUBBER

These tips apply to ALL hose.

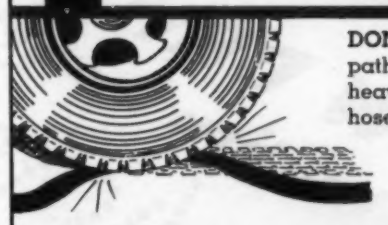
DON'T permit a grab hook or chain hoist or cat line to damage hose before it even gets out on the job.

UNLOAD WITH CARE!



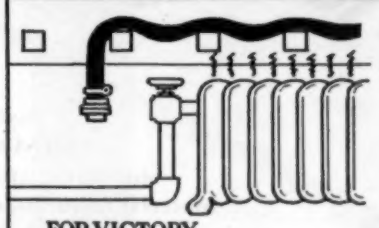
DON'T connect hose to a horizontal pipe or pump outlet and let it drop straight down. Use an L or a gooseneck instead of making the hose take the terrific bend at the coupling.

CONNECT WITH CARE!



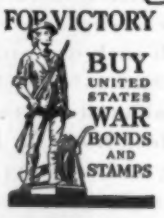
DON'T string the hose line out in the path of moving equipment, or where heavy objects can fall and crush the hose. Hose may appear to take a lot of crushing . . . but it suffers internal injuries that eventually cause it to fail.

LAY WITH CARE!



DON'T hang hose along a line of pegs or nails. Drain it and coil it, or lay it out on a flat surface. Don't store it near heat or direct sunlight. Keep it in a cool, dark place. Keep it away from electrical equipment. Keep it dry.

STORE WITH CARE!



All over this globe, if you could but see, there are bands of American boys. . . . Pitifully small specks they make in the vast expanses they are fighting to free. . . .

They have the physical and spiritual strength to do the job, but they need something more from you and us. . . . Equipment and More Equipment! . . . Every hour consumed in moving equipment thousands of miles to the fighting fronts, leaves our boys exposed just that much too long!

WHAT *WE* ARE DOING TO CONSERVE RUBBER

America's Rubber Companies are playing a courageous role of sacrifice to insure that you shall never have to lay down an air drill, stop a conveyor or lose a head of steam in a pile hammer . . . for lack of hose or belting.

Government is the guardian of our rubber stock. . . . Your needs are being protected by careful allocation . . . But, we, at Goodall, are carrying conservation even further . . .

Under government rubber restriction orders, Goodall is adding *priceless intangible ingredients* to substitute compounds . . . research and technological ability are backed up by 72 years of rubber manufacturing experience in our Trenton mill. Each new rubber restriction is a dramatic challenge to the typical American ingenuity of Goodall technicians.

To our customers who have always looked to Goodall for the best—the safest rubber that money could buy—who have been asking, "What will happen to us, now that you are forced to abandon those fine 'Standard of Quality' brands that were so rich in rubber?"—WE HAVE THE ANSWER—

GOODALL DURATION QUALITY PRODUCTS

"Duration Quality" hose, belting, boots, and Clothing ARE ENGINEERED TO LAST LONGER than regular standardized emergency products. Goodall research laboratories are "building bricks out of straw" these days—developing new constructions that are the envy of the industry.

Are you afraid you may experience bad accidents due to lower standards? Are you worried that you may have to buy hose, belts, etc., over and over again because of early failures? Buy Goodall DURATION QUALITY Products. . . . Remember "You can Always Keep Going with Goodall!"

MAIN OFFICE:
9 S. 36th St.
Philadelphia, Pa.
Branches: New York — Boston—Pittsburgh—Chicago

Factory: Trenton, N. J. (Est. 1870) — 72 Years of "Know-How", Our Most Valuable Commodity

Goodall Rubber Co. of California—Goodall Rubber Co. of Texas

GOODALL
RUBBER COMPANY INCORPORATED

The new Model D Carryall which replaces the former Models X and Z in the LeTourneau line.

New Scraper Model Of 3½-Yard Capacity

In order to simplify and standardize its line of dirt-moving scrapers, R. G. LeTourneau, Inc., Peoria, Ill., has announced a new Model D Carryall which will replace the former models X and Z. This improved and newly designed small scraper has a struck capacity of 3½ cubic yards.

The Model D Carryall incorporates the same features of design and operation which are standard on all the current larger Carryall models. Major changes from the X and Z models include stronger and heavier box-type construction, overhead spring pipe, large carrying apron, and elimination of the throw-arm for raising and lowering the blade and bowl.

Further information on the Model D Carryall, which is designed for use with either the D4 or D6 Caterpillar tractor, may be secured by those interested direct from the manufacturer or from this magazine.

Low Priority Rods For Hard-Facing Jobs

Chromium has recently been placed on the critical list by the War Production Board and hard metal manufacturers instructed to sell hard-facing alloys containing chromium only when orders carry ratings of A-1-j or higher. To serve those companies unable to furnish high priority ratings, Stoody Co., 1134 W. Slauson Ave., Whittier, Calif., has developed two new hard-facing alloys which will be marketed under the trade names of Stoodite K and Stoody Self-Hardening K. These rods contain no chromium and can, therefore, be purchased under the regular A-10 P-100 rating.

The manufacturer states that extensive field tests have shown the new rods to be comparable to regular Stoody alloys as regards ease of application and resistance to wear. Folders describing these two new rods are available from the manufacturer to those referring to this item.

New Truck-Crane Catalog

A new 6-page illustrated folder, No. 1928, has recently been issued by Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago, Ill., on the Model HC-70 truck-mounted crane which can be used with hook-block, clamshell bucket, or dragline bucket or for wrecking operations, steel erection, excavating, material handling, and road maintenance.

The booklet, which contains brief specifications, clearance dimensions and lifting capacities with 30, 40 and 50-foot booms, with or without the use of outriggers, may be secured direct from the manufacturer by mentioning this review.

Runway Construction With One-Pass Mixer

A new 12-page bulletin outlining the traveling-plant method of low-cost rapid construction of asphaltic mats and stabilized bases for roads and runways, and describing and illustrating in detail the construction and operation of the Wood Roadmixer has recently been issued by the Wood Mfg. Co., 208 West 8th St., Los Angeles, Calif.

Information in the bulletin is the result of the construction of more than 60,000,000 square yards of pavement in 31 states and 7 foreign countries, including the paving of streets, roads, highways, and airport and landing field runways. Conditions encountered on these jobs which were handled successfully by the Wood Roadmixer are described, including swampy areas, sandy subgrades, steep mountain grades and sharp super-elevated curves, as well as boggy and unstable sub-bases.

The bulletin, "The Fastest Method of Low-Cost Paving," features continuous one-pass mixing, synchronized mixing and travel speed, and accurate control of proportioning, as well as assembly and construction views of the Wood Roadmixer. Copies of the bulletin may be secured from the manufacturer by mentioning this review.

New Paving Center Strip Without Critical Steel

A descriptive data sheet on the new Keystone center strip for highway and airport-runway construction has just been released by the Keystone Asphalt Products Co., 43 E. Ohio St., Chicago, Ill. This strip, employing asphalt and mineral fillers between two layers of asphalt-saturated liners, was developed to avoid the use of critical steel normally used for longitudinal joints.

Copies of this data sheet, which includes specifications and properties of the new strip, may be secured by interested contractors and engineers direct from the manufacturer by referring to this item.

• Roof truss construction is sped up by boring all thru-bolts holes with ½ in. Heavy Duty SKILSAW DRILL Model 83 (capacity in wood 1¾ in.).
• Counter sinking and thru-drilling is faster and more accurate with a SKILSAW DRILL mounted in a Bench Drill Stand.
SKILSAW DRILLS give war construction the SPEED that leads to victory
• Light, compact and easy to handle, several SKIL SAW DRILL Models (capacities in wood up to 1 in.) are specially designed for close-quarter work, used with or without auxiliary handle.

● Plants that must be built *fast* are being built *faster* when SKILSAW DRILLS are on the job. They're speeding up construction work on war-material factories, cantonments, defense housing projects—because they drill more holes per hour, stretch each day over more work done!

SKILSAW DRILLS are more powerful, yet they're well balanced and easy to handle. They do all drilling, from lead holes for hardware and fixtures to heaviest boring and reaming in lumber and steel. 23 powerful models give you a size for every need—ask your distributor for a demonstration on your own work.

SKILSAW, INC.
4769 Winnemac Ave., Chicago

New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit • Indianapolis
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SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

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UNION IRON WORKS, Inc.

Also Manufacturers of
PILE DRIVER LEADS
GROUT MIXER and EJECTOR
MINE AND SHAFT CAGES
SKIPS AND BUCKETS
AIR LOCKS
SUBAQUEOUS EQUIPMENT
TUNNEL SHIELDS
PILE DRIVER HOISTS

Distributor Service In War Emergency

Local Experience Valuable To Speed Up Selection of Construction Equipment And Service It on Job

By HARRY W. FLETCHER, President, Fletcher Equipment & Supplies, New Orleans, Louisiana

✦ WHEN the National Defense Program began in the autumn of 1940, the distributors of construction equipment and supplies rendered a very important contribution to the successful completion of many vital construction projects throughout the entire country, and today, with this country all-out for victory, they are carrying on in the same manner to the utmost of their ability.

As the defense-construction program developed, speed in delivering and servicing equipment became paramount, as contractors had very limited time in which to complete their contracts and most of them were striving for completion ahead of schedule. Equipment distributors soon found themselves with a large job on their hands, as it required considerable financing to handle the volume of business; the installation of increased repair services; expert service men to keep equipment going in the field; increased operating costs; and the furnishing of engineering advice on the proper selection of equipment for a specific purpose.

More than 50 per cent of the construction-equipment distributors in business today have been in continuous operation for at least 25 years. In many cases, these firms, with the same management personnel, adequately served the country throughout the first World War, continued in business during periods of expansion and depression and now are doing their jobs well in the present all-out war-construction activities.

Choosing Proper Equipment

Because of their experience, equipment distributors have a great service to render in the war-construction program, one of the most important of which is in the selection of equipment for a specific job. Contractors and engineers handling Government construction, whether of cantonments, ordnance plants, air fields, Marine or Navy bases, must have not only the best equipment but it must be suited to the job at hand, before they can begin to produce.

In many cases, the contractor or engineer in charge of a huge project may be from an entirely different section of the country, and in his new surroundings every condition he meets is new to him. Here the equipment distributor can be of great assistance in giving advice as to general operating conditions, soil conditions and characteristics, securing operators, providing rental rates, in the selection and securing of equipment and supplies, and in many other ways. Engineering advice on plant layouts; help in the selection of machines, from among the many makes and types, which are best suited to those particular working conditions; and convenient competent servicing of the equipment are all contributions made by the distributor to the record of speed in construction which has been established on so many projects in the past year and a half.

Services Are Varied

The distributor's service to the contractor extends in many directions, and covers a period from before the contract is awarded to the completion of the work. A distributor, thoroughly familiar with his local conditions and the personnel of Government agencies in that district, can save the contractor considerable time in securing the plans and specifications and other information necessary in the preparation of bids, and at the same time consults with the contractor on costs and planning in the preparation of bids. He can furnish prices and delivery dates promptly and, because of his thorough knowledge of the field as well as of local conditions, can save the contractor valuable time. In the face of equipment shortages and priorities, the distributor can be and is of great help to the contractor in planning the most practical operating procedure with the equipment available, and in suggesting new uses for machines on hand, shifts and substitutions which will make it possible to carry on the job efficiently in spite of the difficulty—or impossibility—of securing a specific type of equipment on a given date.

After the job is started, the distributor's service to the contractor—and to his country—is continued. Often a distributor visiting a job regularly can assist in solving special problems which arise and in increasing output at critical points by suggesting other methods or

(Concluded on page 27)

Contractors Need Transport Mixers!

This Mixer is one of thirty that mixed 400,000 cubic yards in one year on a midwestern ordnance plant.

Open top provides visible mixing with ease of loading.

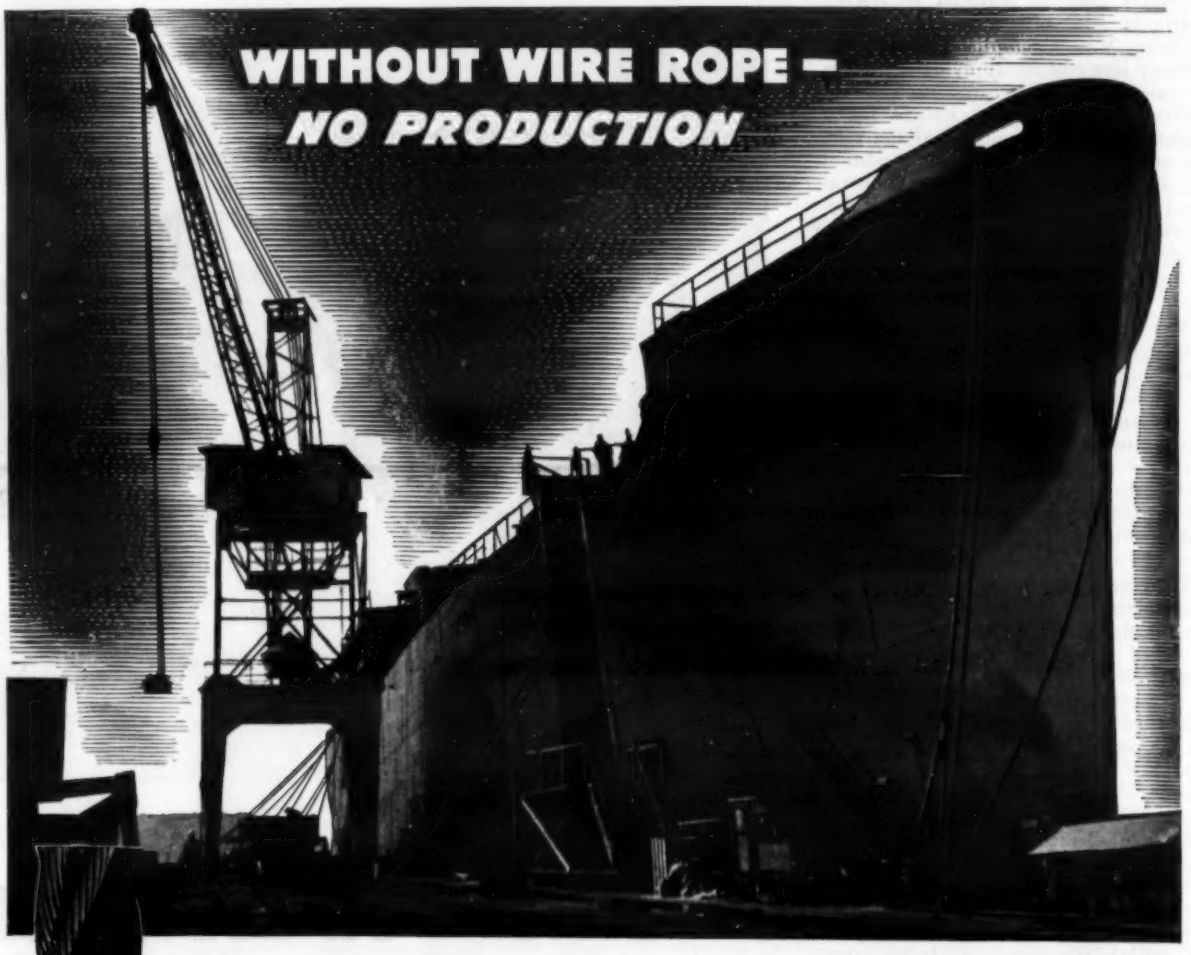
•

Side and rear discharge for widening, patching, paving, and bridge and culvert construction.

•

Inexpensive to own and operate.

CONCRETE TRANSPORT MIXER CO., INC.
600 ROSEDALE AVE., ST. LOUIS, MO.



WITH TRU-LAY *Preformed* WIRE ROPE—
MORE PRODUCTION Your machines will operate with fewer interruptions for wire rope replacement if they are equipped with American Cable TRU-LAY PREFORMED. That means steadier production; time and money saved; steel conserved. . . . Regardless of application, American Cable TRU-LAY PREFORMED WIRE ROPE invariably lasts longer than ordinary non-preformed rope. It gives you greater dollar value in increased service alone. But TRU-LAY does much more than this. It handles much easier, faster, *safer.* It is a flexible, tractable, willing-to-work rope—not the kinky, unruly kind that fights the men who are working with it. It spools on the drum better; runs true and straight over sheaves; requires no seizing when cut. . . . Aid production—conserve steel—save money by using American Cable TRU-LAY PREFORMED WIRE ROPE.

AMERICAN CABLE DIVISION
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Novel Paving Methods Used on Access Roads

(*Continued from page 2*)

in the fill sections and 18 inches in the cuts.

As completion of the pavement and its opening to traffic were paramount, it was decided to excavate the frozen material and restore the planned profile elevation. A ¾-yard General shovel was used for excavating both the frozen material and the run-of-bank gravel backfill, loading to trucks. The frozen material, which amounted to a considerable yardage, was stockpiled at approximately the center of the project. As the only source of borrow within an economical hauling distance was a commercial gravel pit, it was desirable to salvage the frozen material for the construction of the earth shoulders. Since the road had to be opened to traffic as soon as the concrete had cured, it was necessary that the material be readily available and, of course, not frozen. Thawing was accomplished at an extremely low cost by applying 2 pounds of calcium chloride over each 2-foot layer in the stockpile. Except for a slight crust on the outside of the pile, the material was in excellent condition for use, although sub-freezing temperatures prevailed during the period between stockpiling and the construction of the shoulders.

Protection of Subgrade

The low temperatures prevailing, with a minimum of 10 degrees and a maximum of 35 degrees, necessitated the protection of the newly-made grade to prevent freezing and eliminate the possibility of subgrade failure. Obviously, if the backfill were placed on frozen ground, subsequent thawing of the frozen layer would cause an unstable subgrade condition, which would result in costly pavement failure.

To permit uninterrupted paving, it was necessary to complete the preparation of the subgrade sufficiently in advance of the paver that there was no probability of paver shutdown by lack of prepared grade. This required protection of the newly-made subgrade during the period between grading and paving. For this purpose, 1½ pounds of calcium chloride per square yard was applied and worked into the grade for a depth of 2 inches by means of hand rakes and the grade covered with about 9 inches, loose depth, of marsh-grass hay. The hay was removed a reasonable distance ahead of paving to permit setting the forms, replaced after the forms were set, again removed in advance of the concreting, and stored on the shoulder area to be used as protection for the surfacing. With temperatures as low as 10 degrees F., the grade was found to be in perfect condition when it was uncovered.

This same procedure was followed on the first project, with most satisfactory results.

Heating the Concrete

On the second job, the aggregates were not heated, but were free of frost. It was desired to have the concrete at 60 to 70 degrees F. when placed, which was accomplished by heating the mixing water. A 3,000-gallon distributor was supplied with water at approximately 50 degrees F. from fire hydrants. This was raised to 180 degrees in 60 minutes, and the heating unit was capable of maintaining this temperature against the incoming feed to replace the water used in the paver during the mixing operation. The water lost approximately 30 degrees in the transfer from reservoir to mixer, so a Hauck hot water heater was mounted directly on the paver, built into the water line, and restored the 180 degrees deemed necessary with no interruption or time loss.

This produced a concrete of from 60 to 70 degrees F. in an average of 1½ minutes. The batch meter was set for one minute and the actual mixing time varied from one to two minutes, depending on air and aggregate temperatures. The average production from the mixer was 38 batches an hour.

On the first project, the aggregates were hauled to a batching plant at the site of the work. Because of the low temperatures, there was considerable frost in the materials. In order to thaw them, two steam jets were installed in each of the three compartments. Although considerable frost was present, a maximum of 30 minutes was required to thaw the filled bins completely. Once the material was thawed, the jets maintained the aggregate frost-free, with no delays. Mixing water was supplied to the 3,000-gallon distributor tank by a 1,000-gallon tank truck which obtained the water from a fire hydrant. From that point the procedure was the same as on the second project, with a production average of 35 batches an hour.

Finishing and Curing

Although the concrete had an average temperature of 66 degrees F. when placed, the low air temperatures chilled the surface and materially delayed finishing. To overcome this loss of time and resulting increased cost, flake calcium chloride was added to the mix at the rate of 2 per cent of the weight of the cement. This admixture accelerated the initial setting time to permit finishing reasonably close after pouring.

The second project was machine-finished, cured with Sisalkraft paper, and covered with marsh-grass hay to protect it from freezing. On the first

(*Concluded on next page*)

Complete line of gasoline, pneumatic and electric driven concrete vibrators and grinders
Write for information and prices

ROETH VIBRATOR COMPANY
1737 Farragut Ave. Chicago, Ill.

HAULING JEEPS ACROSS RAVINES

Another Job for Wickwire Rope

There are many *extra* jobs that wire rope must do today. The Army, the Navy, and the Liberty Fleet need vast quantities of wire rope.

This points up the message: MAKE YOUR WIRE ROPE LAST LONGER.

When wire rope fails too soon, it wastes badly needed steel, labor and time. If by care you can make *your* wire rope last longer, you are helping to win the war.

When you *do* need wire rope, be sure to get the correct type and size for your service. Our representatives will help you determine the best Wickwire Rope, preformed or Wissco lay, for your use—and after installation will help you get longest life and most economical operation from it.

The reason for the long life of *Wickwire* rope lies in our controlled production, every step of the way from ore pile, to blast furnace, to open hearth, to finished rope.

• • •

Have you a copy of the book "Know Your Ropes"? It will help *you* get longer rope life. More than 25,000 wire rope users all over the world regard it as the authoritative guide to wire rope economy. For your free copy, write Wickwire Spencer Steel Company, 500 Fifth Avenue, New York, N. Y.

WHEN WIRE ROPE LEAVES ITS IMPRINT in sheave or drum groove, there is a filing action on the rope at every start and stop. Grooves having the slightest impressions should be machined and polished. This and forty more rope life-savers are pictured and described in "Know Your Ropes."

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

WICKWIRE SPENCER STEEL COMPANY

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WISSCO PRODUCT

Carey Elastite EXPANSION JOINT

Standard in Concrete Construction for 26 Years

ECONOMICAL and EFFICIENT

Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate Dowel Expansion Joint
Subgrade Felt

THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

Calcium Chloride Aids Maryland Winter Paving

(Continued from preceding page)

project, the narrow 4-foot strips were hand-finished, and then covered with burlap and marsh-grass hay.

Equipment Used

The equipment used on the second job included a ¾-yard General shovel, a Caterpillar No. 12 blade grader, a Cletrac DD tractor and bulldozer, a Buckeye form line cutter, a Buckeye R-B subgrader, Blaw-Knox self-aligning forms, a Koehring 27-E paver with Hauck 350-gallon water heating unit, a 3,000-gallon Etnyre distributor with heating equipment, a Koehring longitudinal finishing machine, a Jaeger concrete spreader and a Jaeger transverse finishing machine. No batching plant was necessary as there were commercial plants within a reasonable hauling distance.

On the first project, the following equipment was used: a Buckeye highway widener, a Caterpillar No. 12 blade grader, an Allis-Chalmers HD tractor and bulldozer, Blaw-Knox self-aligning forms, a Koehring 27-E paver with a Hauck 350-gallon hot water unit attached, a 1,000-gallon tank truck, a 3,000-gallon Etnyre distributor with heater flues, and a 125-ton three-compartment Butler bin equipped with two steam jets in each compartment, supplied by a 25-hp boiler.

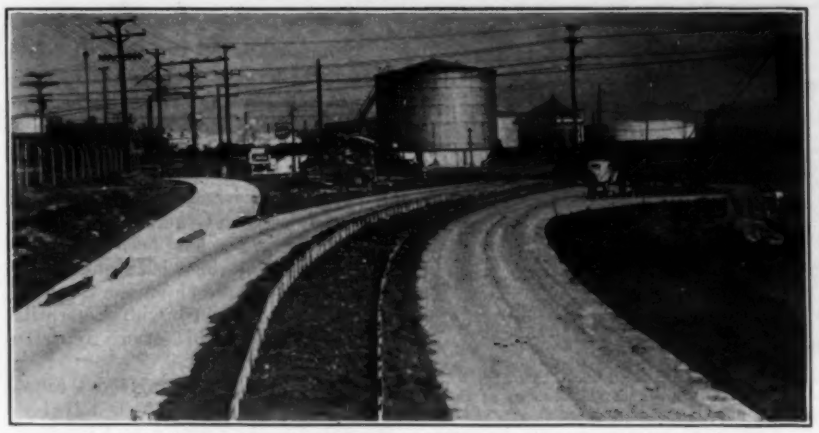
Costs and Results

No cores have been drilled from these pavements so no compressive strengths are known, but beam breaks made during construction showed an average modulus of rupture in seven days of 520 pounds on the second job and 510 pounds on the first project.

Because of varying labor rates, equipment rentals and material prices, it would be difficult to make a fair comparison of costs with those on the usual contract job. However, these two paving organizations recently completed concrete-paving projects under favorable weather conditions, and a comparison of costs discloses a 40 per cent increase in cost on the cold-weather projects. As production was approximately 90 per cent of good-weather or normal-condition production, this cost was considered reasonable, particularly in view of the urgency of the jobs.

Personnel

These two access-road projects were sponsored by the Maryland State Roads Commission, with Arra Chaney, Junior Assistant Highway Engineer, in charge, and Warren B. Duckett and George P. Mays, Superintendents on the jobs.



A channelized intersection of a main highway and a new access road.

Lincoln Electric Changes

Announcement has been made by the Lincoln Electric Co., Cleveland, Ohio, of a number of personnel changes, as well as changes in the addresses of its branch offices.

A. F. Boucher, District Manager of the Detroit Office, has been called for active duty with the Ordnance Department, and will be succeeded by C. H. Buckmaster of the company's Pittsburgh Office. J. H. Cunningham of the Detroit Office will take over Mr. Buckmaster's duties in Pittsburgh. George Bain, also of the Detroit Office, has been transferred to the Saginaw area.

Six of Lincoln's branch offices have recently moved to new addresses. The Oklahoma City Office is now located at 19 No. Ellison St.; the new location of the Milwaukee Office is at 733 No. Van Buren St.; the Chattanooga Office is now at 1111 James Building; the Chicago Office at 323-25 E. 23rd St.; the Dayton Office at 246 Wiltshire Blvd.; and the Fuchs Machinery & Supply Co., which is the Lincoln Office in Omaha, has moved to 521 So. 15th St.

Extra-Strength Clay Pipe

The most recent issue of the Handbook of Vitrified Clay Sewer Pipe contains detailed information regarding the dimensions of salt-glazed vitrified-clay extra-strength sewer pipe and kindred clay products. These pipes are particularly designed for heavy trench loads under modern highways and for use in airport drainage, and are included in the specifications of the American Railway Engineering Association.

More complete information may be secured direct from the Clay Sewer Pipe Association, Pittsburgh, Pa., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8521 Gratiot Ave. Detroit, Mich.

YOU can help build more War Supplies

BY ITS VERY NATURE, the dirt-moving business has always been a race against time, a battle against the elements. Now it is necessary to speed-up even more. Rush your contracts through ahead of schedule! The sooner you finish your project, the sooner its final objective can be realized — the more planes, ships, guns... machines, parts and supplies there will be! There are many ways of cutting corners . . . clipping seconds off this job, minutes off that one. Your job short cuts, and ways of making your machines last longer, will help the other fellow help his country . . . likewise, his ideas will help you. Why not exchange this information? Send your suggestions to us. To encourage this, we will pay for those used in our ads. Start 'em coming . . . NOW!

PROVEN JOB SHORT CUTS

Use your reserve tractors as pushers. The pusher-loading method enables you to haul more material per trip, cut loading time ½ to ⅓ and reduce the wear and tear on your machines.

• • •

Load your scrapers downhill, wherever possible . . . it's quicker and much easier on your equipment.

• • •

Do your culvert pipe excavating with your 2-wheel scraper and 2-Cycle Diesel tractor . . . or with a Hough Shovel and WM tractor. Either machine will finish up the job in a fraction of usual time.

• • •

Handle your clearing with Allis-Chalmers tractors equipped with Carco winches. It's simple to run a winch line into an inaccessible area, attach the cable, and pull out the trees and stumps.

• • •

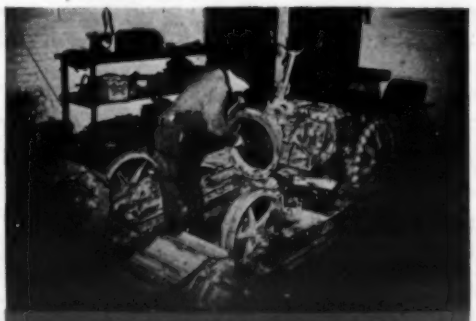
When finishing, windrow your loose rock with your Model AD Motor Grader or Leaning Frame Grader, then pick it up with your four-wheel Gar Wood scraper. Does a fast, clean job.

WIN $5

Allis-Chalmers Will Pay $5 For Each Suggestion Accepted For Publication In Future Advertisements . . . on

1. Job Short Cuts (like examples you have just read.)
2. How To Make Tractors and Graders Last Longer.

Use as many words as necessary to tell your story. Illustrate, if you wish. Awards will be based on the value of the suggestions, not on literary style. Everybody eligible.

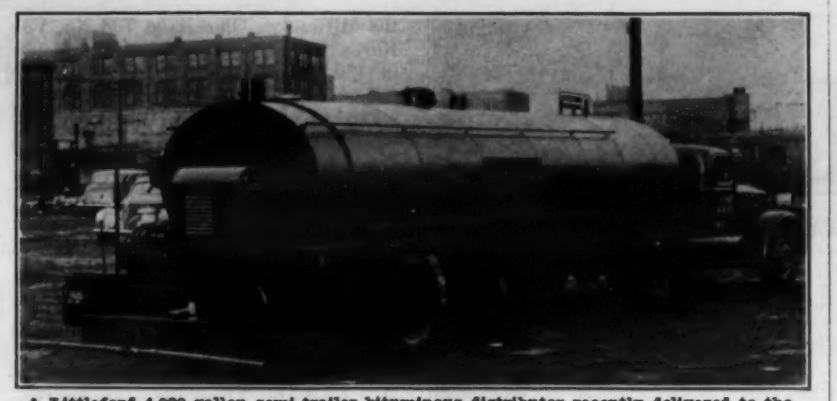


KEEP 'EM ROLLING

Keep your equipment in first-class condition. Your Allis-Chalmers dealer is fully equipped to give you A-1 service on repairs, parts, rebuilding jobs. He may have good buys on used machines, too. Keep in touch with him.

INVEST IN VICTORY . . . BUY WAR SAVINGS BONDS AND STAMPS

ALLIS-CHALMERS Power for Victory!



A Littleford 4,000-gallon semi-trailer bituminous distributor recently delivered to the Service Supply Co. of Philadelphia for one of its customers.

Distributor Carries Half-Tank-Car Load

A semi-trailer 4,000-gallon bituminous distributor was recently delivered by Littleford Bros., Inc., 485 E. Pearl St., Cincinnati, Ohio, to Service Supply Corp., Philadelphia, Pa., for one of its customers. This big outfit carries almost a half-tank-car load of bituminous material and is unusual in that it is made with frameless construction eliminating all of the trailer chassis. It is constructed in such a manner that the tank supports itself with a fifth wheel welded to the front of the unit by which it is attached to the truck tractor.

The tank of this Spray Master Model CLRA Littleford distributor is equipped with baffle plates which help in stiffening the tank for this type of service. This unit eliminates the use of all metal trailer frames and also eliminates the highway tax put on units using trailer frames. This is all in addition to the savings in the use of steel, a patriotic duty of every manufacturer and user today.

Complete information regarding this 4,000-gallon semi-trailer distributor and other Littleford bituminous equipment will be furnished free on request to those writing direct to the manufacturer and mentioning this item.

New A-W President

Announcement has been made of the election of McClure Kelley as President of the Austin-Western Road Machinery Co., Aurora, Ill., to succeed Samuel F. Beatty who will retire from that office on August 1. Mr. Kelley began his association with the company in 1929 as Assistant Treasurer, becoming Treasurer in 1931, and Vice President and Treasurer in 1940.

Mr. Beatty, who has been with Austin-Western for 43 years, the past 15 as President, will become Chairman of the Executive Committee.

Caterpillar Promotions

Announcement has recently been made by the Caterpillar Tractor Co., Peoria, Ill., of a number of promotions and personnel changes. E. W. Jackson has been made Assistant to the President and has been succeeded by D. O. Nash as General Service Manager. Mr. Jackson, who has been General Service Manager since 1937, has been associated with Caterpillar since 1929 and is well known for his diesel engine research. Mr. Nash has served with Caterpillar dealers and as field service representative for Caterpillar.

Gail E. Spain, General Sales Manager since November, 1940, has been appointed to the position of Vice President to succeed the late D. G. Sherwin, and John Q. McDonald has been promoted to General Sales Manager. Mr. Spain, who joined the Caterpillar organization in 1929, will move to the San Leandro, Calif., office to direct activities there and coordinate operations with those in Peoria. Mr. McDonald, who has served as Export Sales Manager since May, 1940, has been with Caterpillar since 1927.

J. D. Fletcher, Vice President, will take over the active direction of export sales in addition to his duties as head of the Export Department.

Columbia Chemical Mgr.

Announcement has been made by the Pittsburgh Plate Glass Co. of the appointment of R. W. Miller, who has been associated with the company for the past 12 years, as Manager of the Technical Service Department of the company's Columbia Chemical Division, to succeed Dr. G. L. Cunningham who has resigned.

Mr. Miller has done considerable research in the use of calcium chloride in soils, and has been active in promoting the principles of soil stabilization in highway and airport construction.

The USO War Fund Campaign is on. $32,000,000 is needed. Give now!

CUMMER
ASPHALT PLANTS

Portable Combination Hot and Cold Mix Plants
Portable Hot Mix Plants
Stationary Combination Hot and Cold Mix Plants
Cummer Combination Dryer-Coolers.
Steam Jacketed Mixers 400 to 8000 pounds capacity.
Cummer Internal Fire Dryers
Electric Batch Timers

THE F. D. CUMMER & SON CO.
Euclid and 17th, Cleveland, Ohio

Gardner-Denver CF89H Continuous Feed Drifter on the Granby Diversion Tunnel.

For Faster Footage on Tunnels of Today and Tomorrow— ... *Gardner-Denver CF89H Drifters*

ON practically every major tunnel job, Gardner-Denver Drifting Drills have demonstrated their speed, reliability and low cost performance. And now Gardner-Denver builds another outstanding drifter to carry on the tradition of Gardner-Denver leadership—the Continuous Feed CF89H. Unique in design—incorporating latest refinements in drifter manufacture, the CF89H Drifter is making a name for itself wherever it has been introduced. Gardner-Denver Company, Quincy, Illinois.

Here Are Some of the CF89H Features That Assure Faster Tunnel Progress at Lower Cost

1. Slow Motion—the piston feed motor makes only 60 strokes in drilling a 24-inch change—keeps maintenance cost at a minimum, assures longer life for the feed motor.
2. Less Vibration—Feed motor built into drill proper. Its weight dampens vibration—aids in absorbing recoil. Overall maintenance cost actually lower than that of a hand-cranked drill.
3. Convenient Controls—located in drill backhead—do not invite destructive backing out on full head of air. Feed throttle controls direction of feed, as well as power and speed.
4. Higher Drilling Efficiency—assured because drill is always held in proper relation to the shank.
5. No Extra Hose—the motor gets its air from the main air inlet of the drill—eliminating the need for extra hose.

Gardner-Denver Bulletin CF1 gives all the facts about CF89H Continuous Feed Drifters. Write for your copy.

GARDNER-DENVER PRODUCTS SPEED VICTORY

GARDNER-DENVER *Since 1859*

A Soil-Cement Base For Airport Taxiway

Clay Subgrade Stripped and Processed with Sand Before Cement Stabilization Began At Southern Airport

✦ DIFFICULTY with the wet clay subgrade at a new airport being built in the south required drastic measures to dry it and insure adequate bearing for the heavy airplane loadings expected when it is placed in service for the Army. Cement stabilization was selected as the method of providing a base for the taxiway from the parking apron to the center of the field where the three runways cross. The parking apron was also similarly treated.

Work was started, using 10 per cent cement and the natural sand-clay loam soil. On reaching the junction of the parking apron and the taxiway drainage slopes, the subgrade material proved to be too wet below the surface to work satisfactorily. To overcome this, the top 6 inches of clay was removed and stockpiled. Then the next 6 inches was worked over by disks and turned over by plows until it was reduced to optimum moisture. This bottom layer then was compacted with sheepsfoot rollers, and 4 inches of the old top material was replaced and dried thoroughly by disking and plowing until it too was below the optimum moisture content. Then 2½ inches of bar-run sand was spread over the area.

Mixing the Cement

Following this, 8 per cent of cement by volume was spread over the area in 10-foot lanes, using one bag across the 10-foot lane and spacing the bags 4.44 feet apart, and broomed longitudinally to spread it uniformly. The cement, bar-run sand and 4 inches of dried subgrade material were then mixed by a Flynn Road Builder, applying water through the machine during mixing to give the proper moisture content. On this job the close spacing of hydrants eliminated the need for the use of tank trucks, a long hose being used instead. The 10-foot lanes ran the full width of the parking apron, 400 feet long, after the 1,300 feet of taxiway from the center of the field to the parking apron and through to the back of the parking apron had been mixed for the full distance and 75 feet wide.

When mixing the 400-foot lanes for the parking apron, the mixing machine ran up one lane and back on the adjacent lane at slightly less than 11 feet per minute average, including the turns at the ends of the lanes. Sheepsfooting for compaction, immediately following the spreading of the material, was started as soon as 100 feet of a 10-foot lane had been mixed. The sheepsfoot roller was worked forward to the mixing machine and then back to the end, then forward to the advanced position of the mixing machine and back. In this way, a 400-foot lane had been compacted completely by the sheepsfoot roller by the time the mixer had reached the end of a 400-foot lane and made its turn into the adjacent lane.

The blading of the compacted lane was done as a unit, plus a small part of an adjacent lane, using a motor patrol blade to break up the footmarks of the sheepsfoot roller and to fill the cup-like holes. Following completion of the blading, the surface was broken with a nail drag, and then rolled by an 8-ton steel-wheel tandem roller, followed by a Bros traffic roller. During and after sheepsfoot rolling and blading, the surface was sprinkled with water by gravity from a tank truck with a perforated pipe at the back to maintain the material at optimum moisture and make up for loss by evaporation. Upon completion of the steel-wheel and traffic rolling, the surface was covered with 2 inches of loose hay and kept wet for 7 days for curing.

Service Installations

All services for the parking apron, including water, gasoline and electricity, as well as the tie-down anchors for the planes, were installed after the soil-cement stabilization had been completed and cured. The tie-down anchors consisted of helical screws and bars, which were supposed to be turned down into the ground to act as dead-men anchors for the planes. The clay was so tight in the subgrade that it was necessary to excavate the holes for the anchors and then back-tamp the material on top of the screws.

Personnel

The construction of the 72,000 square yards of soil-cement parking apron and taxiway 6 inches thick for this new southern airport was done by contract under the direction of the U. S. Engineer Department.

In the interest of national security, the location and mention of personnel connected with wartime construction will be omitted for the duration.

Buy U. S. War Bonds and Stamps

SAFETY-IZE
PUNCTURE SEAL COMPOUND *for pneumatic tires*

—"a friend indeed" in this hour of need!—

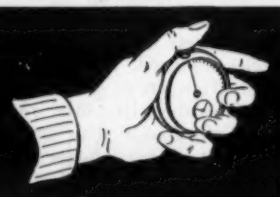
Write for circular

Tires going—going—gone? Make ALL your tires last much longer by putting SAFETY-IZE in the tubes.

SAFETY-IZE, in your tires, will be ALWAYS ON THE JOB to plug and seal punctures, extending the life of the tires by guarding against under-inflation.

SAFETY-IZE MFG. CO., 2814 Fullerton Ave., Chicago

Every extra pay yard gained — every minute you can save to speed completion of your present job enables you to release your equipment just that much sooner for work on other Victory projects



Get Bigger Loads Quicker
with Your Present Equipment...for Victory

Load LeTourneau Carryalls and Tournapulls Downhill; Use "Wrinkle" Loading Method; Break up Hard Cuts with Rooters.

LeTourneau Rooter in no way interferes with pusher loading . . . enables pusher tractor to loosen this tough cut between Carryall loads on Hy. 49, near Jamestown, Calif. Contractor: E. G. Keeble.

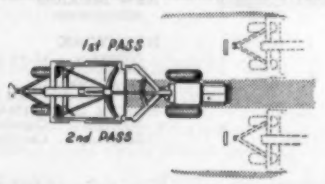
See how these job-proved methods enable you to get bigger loads and more of them quicker with tractor-drawn LeTourneau Carryall Scrapers and with Tournapulls:

LOAD DOWNHILL

Loading downhill, wherever possible, offers you many advantages . . . creates greater drawbar pull when using older, less-powerful tractors . . . gives practically same help as pusher loading when pusher tractors are not available. In any case, you get bigger Scraper loads quicker.

NEW LOADING "WRINKLE"

Many smart contractors shorten loading time by using the "wrinkle method." Here's how it works: make the first two Scraper cuts 4 or 5 feet apart. This loosens the dirt between. Then, on the third cut load down between the first two passes, picking up the ridge, or "wrinkle" of loosened material. Results: faster, easier loading. Try this job-tested method on your job. The accompanying diagram shows you how.



Loading is faster and easier when operators straddle "wrinkles" and pick up loose dirt left between two previous passes.

ROOT TOUGH MATERIALS

LeTourneau Rooters increase the materials your Scrapers and Tournapulls can profitably handle, by making easy-to-handle scraper dirt of all tough materials, save solid rock . . . same time, eliminate blasting. Again, you increase the yardage you can handle . . . and reduce tire wear and Tournapull and Scraper maintenance. By hooking a Rooter to your pusher tractor, for Rooting between loads, you can help solve your own tractor shortage problem.

ANOTHER TIME-SAVER— DEALER SERVICE

Your local LeTourneau - "Caterpillar" dealer can furnish you with many more job-planning ideas for getting maximum yardage and lowest costs with LeTourneau equipment. He also has parts and factory-trained servicemen to keep your equipment working at full efficiency for Victory. Make him your Victory Construction Headquarters. Call on him any time you need help on job planning or equipment service.

HELP YOU WIN WAR— LeTOURNEAU AD POLICY

The General Manager says, "All LeTourneau efforts must be concentrated on winning the war." That means LeTourneau advertising, too. Because construction work is so important and because so many of you will have to make your present equipment last for the duration, we believe our advertising can best help by:

1. Suggesting ways of getting more work from your present equipment.
2. Showing and telling how others are using LeTourneau equipment to increase production.
3. Aiding you with service and repair ideas.

These things we will strive to do in every LeTourneau advertisement.

LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.
*Name Reg. U. S. Pat. Off.

Economy Tips

DO'S

1. Keep your battery well charged.
2. Keep your tires inflated to specifications.
3. Check your wheels for tight bearings and dragging brakes.
4. Use good oil which is not too heavy.
5. Get the periodic tune-up habit for general conditioning.

DON'T'S

1. Don't race your motor.
2. Don't speed in low or second gear.
3. Don't do unnecessary choking.
4. Don't keep your motor running while you stop to talk to a friend or get out to run a short errand.
5. Don't apply uneven foot pressure on the throttle. Every time you step on the gas, you shoot a charge of raw fuel into the carburetor.

Conserve Gasoline! It's Vital to Victory!

(*Continued from page 2*)

It regulates the mixture by means of jets which in time become either worn or fouled by lead or dirt or corrosion of carbon material in the gasoline. After 10,000 miles, depending on the type of gasoline used and the condition of the air cleaner, jets should be cleaned and worn ones replaced. You can, of course, install smaller jets to get a leaner mixture, but ordinarily this results in poorer performance with little or no economy. It causes a lesser vacuum to be set up in the manifold so that the automatic step-up valve is opened more frequently to produce an extra rich mixture.

Besides fouling the jets, a dirty air cleaner may also affect your mileage by obstructing the passage of air into the carburetor and changing the mixture. Failure to wash out air cleaners and to change oil filters according to directions is responsible for more trouble than is usually supposed.

Ignition

Second in importance to the carburetor is your ignition. Factory timing specifications are worked out to give the maximum of power, economy and smoothness, and these specifications should be followed for best results. You can approximate the correct timing without instruments, but to insure accuracy a neon timing light should be used. The day of mechanical guesswork has passed.

The spark setting should vary with the type of gasoline used. Advance your spark as far as you can and still get efficient performance. That means no kick-back and no ping. A ping, incidentally, is not just a noise. It is a definite force, and in case you don't know, the cause is as follows: the first part of the charge of gasoline ignites from the spark, while the other part farthest from the spark is ignited, not by the advancing flame, but by the compression set up by the already burned and expanding portion. That causes the ping. It is both harmful and wasteful. The difference in correct combustion and a ping may be described as a steady push and a sudden blow. All the porcelains in a set of spark plugs may be broken from this cause. Loss of power results because the motor can not absorb all of the sudden force generated, and the excess goes off in the form of heat.

You can take the ping out of lower-grade gas by retarding the spark; you can advance it considerably with octane or ethyl gas without ping. Altitude will also affect this, a slightly faster spark being possible at higher altitudes.

A road test will best determine your spark setting. At 30 or 40 miles an hour, step on the throttle. If the setting is right, there should be a slight ping, but only for a moment until the automatic adjustment takes effect.

The recommendation to change spark plugs every 10,000 miles is not just advertising. If you don't believe this, you can easily verify it by having your plugs tested; and remember that a plug which shows only a bit weak on the tester will perform far worse under actual engine conditions. Besides being responsible for much hard-starting trouble, poor plugs may easily be costing you an extra gallon of gas out of every ten. Be careful to use the type of plugs specified for your motor, clean them frequently, and reinstall them in reverse order to equalize wear.

Even a low battery may affect fuel consumption. A weak primary circuit means a weak secondary circuit with inefficient combustion. Keep your battery charged to peak.

The Compression Test

Poor compression naturally means loss of power and poor economy, and it may be caused by worn rings, burnt or sticky valves, faulty valve seats, or tight tappets. The compression test included in a tune-up will tell whether or not your compression is low, after which the cause must be located and corrected.

If your motor loses oil, it is probably getting blow-by, but not necessarily so. Oil loss can be caused by a leak around a loose fitting, or by a defective diaphragm on double-diaphragm fuel pumps which causes oil to be sucked from the crankcase into the combustion chambers. A defective fuel pump may also cause an excessive amount of gasoline to be pumped into the carburetor with disastrous effect on consumption.

Friction Costs Money

Remember that friction decreases

To Save Vit

BLAW-KNOX

TO THE CONST

THIS NATIONALLY KNOWN DISTRIBUTING ORGANIZATION WILL MAKE THE PLAN EFFECTIVE

ALABAMA
Birmingham.....Young & Vann Supply Company

ARIZONA
Phoenix.....State Tractor Equipment Company

ARKANSAS
Little Rock.....Lyons Machinery Company

CALIFORNIA
Los Angeles.....LeRoi-Rix Machinery Company
Los Angeles.....E. M. Ornitz
San Francisco.....C. H. Grant Company

COLORADO
Denver.....Ray Corson Machinery Company

CONNECTICUT
New Haven.....The W. I. Clark Company

DELAWARE
Baltimore, Md.....Henry H. Meyer Company, Inc.

DISTRICT OF COLUMBIA
Washington...Matt A. Doetsch Machinery Company

FLORIDA
Jacksonville.....Quinn R. Barton, Inc.
Marianna.....Berry & Brown, Inc.
Miami.....East Coast Equipment Company, Inc.
Tampa.....Epperson & Company

GEORGIA
Atlanta.....W. C. Caye & Company

IDAHO
Boise.....Intermountain Equipment Company

ILLINOIS
Chicago.....O. T. Christerson Company
St. Louis, Mo.....O. B. Avery Company

INDIANA
Indianapolis.....Reid-Holcomb Company

IOWA
Davenport.....Clarke-Robinson Company
Des Moines.....Herman M. Brown Company

KANSAS
Kansas City, Mo.....G. W. Van Keppel Company

KENTUCKY
Louisville...Brandeis Machinery & Supply Company

LOUISIANA
New Orleans...Southern States Equipment Company

MAINE
Portland.....Stanley & Cadigan Company

MARYLAND
Baltimore.....Henry H. Meyer Company, Inc.

MASSACHUSETTS
Boston.....The Equipment Company
New Haven, Conn.....The W. I. Clark Company

MICHIGAN
Detroit.....Wm. P. Favorite Company
Grand Rapids.....Contractors Machinery Company
Iron Mountain.....Service & Supply Division

MINNESOTA
St. Paul.....Borchert-Ingersoll Company

MISSISSIPPI
Amory.....Dalrymple Equipment Company

MISSOURI
Kansas City.....G. W. Van Keppel Company
St. Louis.....O. B. Avery Company

MONTANA
Billings..Western Construction Equipment Company

NEBRASKA
Omaha.....Anderson Equipment Company

NEVADA
Los Angeles, Calif.....E. M. Ornitz
San Francisco, Calif.....C. H. Grant Company

NEW HAMPSHIRE
Barre, Vermont.....Cassellini-Venable Corporation
Boston, Mass.....The Equipment Company
Portland, Maine.....Stanley & Cadigan Company

NEW JERSEY
New York, N.Y.....R. K. Brooks Company
Philadelphia, Pa.....Giles & Ransome

NEW MEXICO
Albuquerque.....Power Equipment Company

NEW YORK
Albany.....Larkin Equipment Company
Buffalo.....Trevor Corporation
New York.....R. K. Brooks Company

NORTH CAROLINA
Raleigh.....Carolina Tractor & Equipment Company
Salisbury...Carolina Tractor & Equipment Company

NORTH DAKOTA
Fargo.....Dakota Tra... Co...

OHIO
Cleveland.....H. B. ... Co...
Columbus..... Co...
Cincinnati..... Co...

OKLAHOMA
Oklahoma City..... Co...
Tulsa..... Co...

OREGON
Portland.....Contrac... Corpo...

PENNSYLVANIA
Harrisburg..... Co...
Philadelphia..... & Ra...
Pittsburgh..... Co...

RHODE ISLAND
New Haven, Conn..... Co...

SOUTH CAROLINA
Columbia.....Jeff Hun... Co...

TENNESSEE
Chattanooga..... Co...
Knoxville.....Wilson-... Co...
Nashville.....Wilson-... Co...

TEXAS
Dallas.....Conley-Lott-... Co...
Houston..... Co...
San Antonio..... Co...

UTAH
Salt Lake City..... Co...

VERMONT
Barre..... Co... Corpo...

VIRGINIA
Roanoke, Roanoke Tracto... Corpo...
Richmond, Roanoke Trac... Corpo...

WASHINGTON
Seattle..... Co...
Spokane..... Co...

WEST VIRGINIA
Charleston, Charleston Tr... Corpo...
Clarksburg, Charleston Tr... Corpo...

WISCONSIN
Milwaukee...Hunter Tra... Co...

WYOMING
Billings, Mont., Western C... Co...
Denver, Col.....Ray ... Co...

CLEARING HOUSE FOR

CONCRETE SPREADERS · ROAD...
CONCRETE FINISHING MACHINES · BINS AND B...
BULK CEMENT PLANTS · CENTRAL MIXING ...

mileage, and that the heavier the oil the greater the friction. Besides reducing friction, a light oil lubricates better than a heavy. If your motor can stand a 10 weight without loss, you should use a 10. The general tendency is to use oil that is too heavy. Always, of course, use good oil.

Low tires also mean increased friction which, in addition to pulling down mileage, also increases rubber wear.

While the things mentioned here are the most common mechanical factors, there are others which play a part. Keep in mind the principle of "all parts working in harmony" and remember that good economy is essentially a matter of the good condition of your entire equipment.

The Pay-off

One thing more. Regardless of how good your equipment is, you can not expect economy with wasteful operating habits. Such poor practices as excessive choking, speeding, idling when not in use, etc., will offset all the economy of perfect mechanical condition.

From Salvaged Scrap To Tanks and Cannon

As its goal in the "Salvage Scrap Metal" campaign, the Standard Oil Co. of Indiana expects to furnish 15,000 tons of steel and iron scrap, or enough to make a cruiser, 450 tanks, 13,000 cannon, 536,500 machine guns, or 5,500,000 rifles. More than 2,000 tons of steel and iron scrap have already been saved at the Whiting, Ind., refinery alone in the first three months of this year.

To aid the scrap campaign, much old equipment at the six Standard of Indiana refineries is being dismantled this year, where in normal times it would not be torn down until later. The scrap is disposed of for use by war industries, after all dismantled equipment has been sorted, and plate, pipe, fittings, valves, etc., which are usable have been set aside for re-use in the refineries.

The Standard Oil Co. of Indiana is concentrating on the production of fuel and lubricants for the armed forces, war industries, and the farm front.

tl War Materials

RESENTS A PLAN

RUCTION INDUSTRY

...the plan...

Blaw-Knox Company, through its offices and its sixty-five distributors, is establishing a national clearing house for used construction machinery of the types listed below which may be utilized for war construction.

Contractors having idle equipment and those in need of such equipment for war construction are invited to communicate with the nearest Blaw-Knox Distributor or with the Company direct, giving details including selling or rental prices.

The Company will then place the seller and buyer in contact with each other through their respective Blaw-Knox Distributors. The Blaw-Knox Company will not enter into the transaction beyond this point as it is interested only in serving to the greatest extent possible in the conservation of vitally needed war materials.

Because our widespread organization is expert in the distribution and servicing of construction machinery, there will be further assurance that equipment at present available will be placed in use where needed on war work. This plan should result in a decided saving of critical materials otherwise used in the manufacture of new equipment.

Naturally, the Blaw-Knox Company will continue to manufacture new equipment to the extent that Government Authorities deem necessary for vital construction.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
2067 Farmers Bank Building Pittsburgh, Pennsylvania
NEW YORK—Canadian Pacific Building • CHICAGO—Peoples Gas Building
PHILADELPHIA—Broad Street Station Building • BIRMINGHAM—Brown-Marx Building
Representatives throughout the country

CLEARING HOUSE FOR

TRUCK MIXERS • CLAMSHELL BUCKETS
CONCRETE BUCKETS • STEEL STREET FORMS
TRUCK TURNTABLES • TAMPING ROLLERS

The Army Half-Trac scout car, made by the White Motor Co., will doubtless influence the type of truck to be built in the peace to come.

Tread Drive Truck For After-War Use

Construction men and farmers have been looking over the Half-Trac reconnoissance vehicles which are moving across muddy fields and swamp lands in the vicinity of Army camps. These vehicles offer another example of a machine put into mass production for war use which is bound to find increasing application in peacetime operations.

These Half-Tracs have been developed by the White Motor Co., Cleveland, Ohio, in collaboration with the U.S. Army Ordnance Department. They are supported in the rear by a tractor belt which gives them effective traction power on any kind of ground. With a wide range of gear ratios, these units can vary their speed from a slow crawl in difficult spots to 50 miles an hour on hard ground or on highways. The accompanying illustration shows a squad of these vehicles in a terrain similar to that frequently met in construction operations.

Three New Motors

Three new motors, a vertical general-purpose polyphase motor, a vertical shielded polyphase motor of 1 to 20 hp, and a vertical shielded single-phase motor of 1 to 5 hp, have been added to the Tri-Clad motor group manufactured by the General Electric Co., Schenectady, N.Y. The shielded-type motors are especially adapted to pumping applications, and the general-purpose motor is suitable for use in the machine tool industry as well as for agitators, mixers, and similar applications.

The shielded-type cover is contoured to deflect dripping liquids and falling objects. All openings in the stator frame and end shields are protected against the entrance of splashing liquids. Air is discharged downward at low velocity, thus permitting little or no dust disturbance around the motor. These motors are suitable for outdoor operations, except where extremes of moisture, dust, or other harmful agents make the selection of fan-cooled motors more economical.

The Navy "E" Awarded To Broderick & Bascom

In recognition of its efficiency and contribution to war production, the Broderick & Bascom Rope Co., St. Louis, Mo., has been awarded the Navy "E". Captain Edwin A. Wolleson, U. S. N. (retired), Commanding Officer, Navy Pier, Chicago, made the presentation at fitting ceremonies held at the plant on April 30, and John K. Broderick, President of the company, accepted the Navy burgee in behalf of the management. Jack Schneider, foreman of the stranding department, and Joe Saettele, foreman of the splicing department, accepted "E" buttons in the name of the company employees.

In accepting the award, J. K. Broderick emphasized that it had not been won by any concerted effort at a production record. "The true significance of this award", Mr. Broderick said, "lies in the fact that it was won unknowing and unsought in the regular day by day effort of the men and women of our organization in expressing their contribution toward the greater goal of victory."

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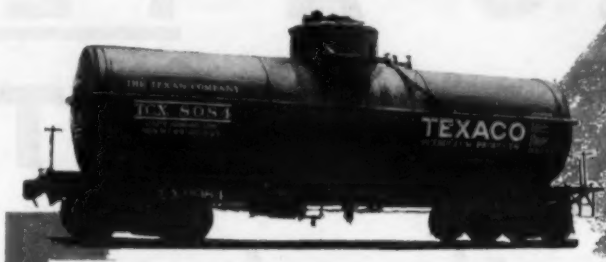

HEAT THAT ASPHALT OR ROAD OIL WITHOUT DELAY!

ROADS — well maintained — are of prime importance in wartime . . . for fast, unhampered transportation and communication between military and industrial centers. Good roads contribute to conservation of tire rubber, too — add many more rolling miles to the tires of all classes of motor vehicles.

Highway authorities recognize the vital necessity of road maintenance as essential to the war effort. And Cleaver Bituminous Boosters and Tank Car Heaters are more important than ever today . . . providing fast, efficient heating of bituminous material in tank cars and storage tanks at lowest cost. Road crews are not delayed when Cleaver equipment is on the job — heating and pumping oil is no tedious, time-consuming job. Bituminous boosters and tank car heaters were pioneered by Cleaver — hundreds of them are in nation-wide use. Their practical, exclusive design was perfected by Cleaver engineers. They are without equal in performance.

Write for complete information.

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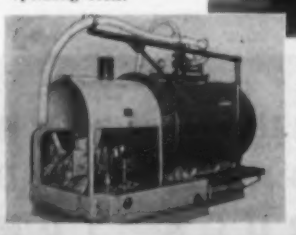
Pioneer Builders of Heating Equipment for Bituminous Materials in Tank Cars and Storage Tanks . . . Cleaver Heaters and Boosters . . . Cleaver Automatic Steam Plants.

•

Cleaver Portable Pumping Booster mounted on truck in service of Oklahoma Bituminous Distributing Co., Ada, Oklahoma. This unit is operated in airport and military road construction.

Cleaver Portable Tank Car Heater — a high pressure, oil-fired, compact, mobile heater available in two and three tank car sizes. Famous Cleaver design boiler with four-pass flue travel assures most economical operating costs.



Typical Cleaver Portable Pumping Booster — withdraws pumpable bituminous material from car — heating by direct firing to application temperature in one operation. Raises car temperature 50 degrees per hour. Available in three sizes — on truck mounting or 4-wheel trailer.

Cleaver
BITUMINOUS BOOSTERS
. . TANK CAR HEATERS

Flood Control Works For Industrial Area

U. S. Engineer Department Directs Construction of Flood Protection Projects In Binghamton, N. Y., Area

✦ FLOOD-CONTROL operations in the Upper Susquehanna River valley were made necessary by the seemingly increasing frequency of flood flows and the rapid growth of the area as an industrial center. Since 1865, about twenty major floods have occurred, over 75 per cent of which were the result of winter and spring storms. The worst summer storm occurred during July, 1935. From July 6 to 9, a series of thunderstorms broke all 24, 48 and 72-hour rainfall records for the area. Two floods occurred during successive weeks in March, 1936. The flood of July, 1935, caused $16,728,000 direct damage and those of March, 1936, direct damage of $3,855,000, while the indirect losses were about the same amounts.

In the Flood Control Act of 1936, Congress authorized the construction of detention reservoirs and related flood-control works for the protection of Binghamton, Hornell, Corning, and other towns in New York and Pennsylvania, at an estimated cost of approximately $27,154,000, with costs of lands and damages $5,930,000 additional. Funds were made available in July, 1936, and work was started by the First New York District, U. S. Engineer Department, and continued by the Binghamton District which was created for the purpose.

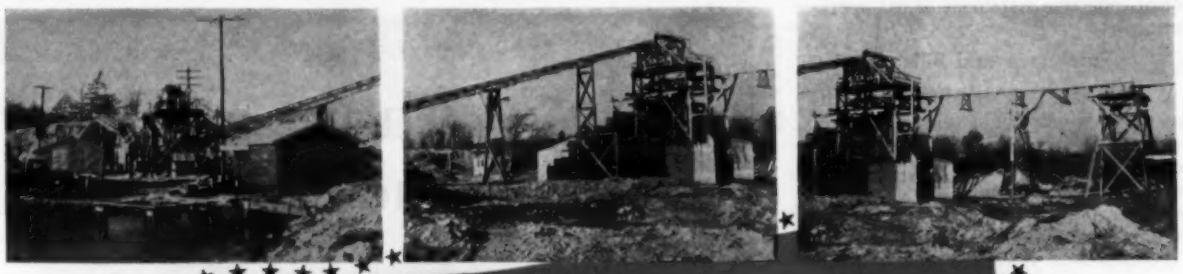
The program at Binghamton, N. Y., was divided into five sections: Section 1, 2,000 feet of new concrete flood wall and 4,000 feet of levee on the south bank of the Susquehanna River, and a 1,200-foot conduit for Park Creek; Section 2, about 3,100 feet of new concrete flood wall, about 13,100 feet of levees on both the Chenango and Susquehanna Rivers, and about 2,100 feet of creek channel improvement; Section 3, 650 feet of new concrete flood wall, raising 970 feet of existing wall and appurtenant drainage structures on the right bank of the Susquehanna River; Section 4 includes 5,450 linear feet of concrete flood walls and appurtenant drainage structures and 200 feet of earth levee on the left bank of the Chenango River; and Section 5, flood protection works on the Susquehanna River in the vicinity of Chamberlain Creek.

Design of Walls

The wall on Section 1 is of the cantilever type without offsets, 1 foot wide at the top and 1 foot 10 inches wide at the base where the reinforcing is hooked under 5-inch channel waling tack-welded and bolted to the steel sheet piles which form the foundation as well as the cut-off for the wall. AP-3, DP-2 and ZP-32 section Bethlehem sheet piling was used, with the deeper pile sections for the higher walls to give greater structural strength. Alternate piles were left 1 foot higher and these piles have the web arched toward the river or pressure side for greater resistance. A 5-inch 7-pound

(Continued on page 38)

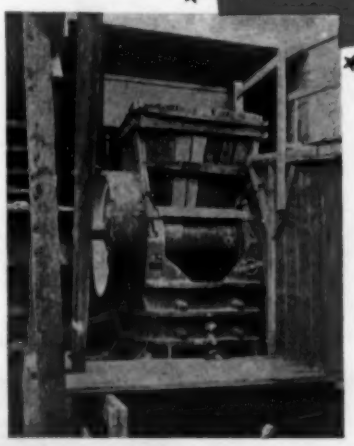
U. S. E. D. Photo
The 17-foot diameter arched conduit built by Pepper Bros. and Murray to carry Park Creek through a section of Binghamton, N. Y.

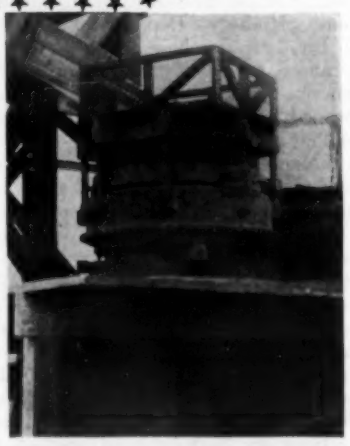


250 TONS PER HOUR
Keeps War Construction Moving

Crystal Concrete Co. of South Braintree, Mass., has another Telsmith gravel plant. This new one, near Weymouth, was erected solely to supply war projects. Production was started at the rate of 175 tons per hr. After a short "breaking-in" period, regular production will go up to 200 to 250 tons per hr. In the pinch . . . when win-the-war work calls for top speed and peak production . . . experienced operators depend on Telsmith equipment. You can, too. It will pay you to get Bulletin G-34.

TELSMITH





Telsmith 18 x 30 Roller Bearing Jaw Crusher (left) handles plus 3¼" material. It is fed by Telsmith 30" x 5'6" Reciprocating Plate Feeder over a Telsmith No. 450 Rotary Grizzly with 3¼" spaces. Feeder takes raw bank material from 15 cu. yd. hopper fitted with a rail grizzly to reject the few oversize boulders. Crushed material, and minus 3¼" from Rotary Grizzly are conveyed to scalping screen (lower left).

Telsmith 4' x 10' Single Deck Pulsator (lower left) acts as a scalping screen. Minus 2" throughs go to finished product conveyor; plus 2" oversize into Gyrasphere Crusher (right).

Telsmith No. 36 Gyrasphere (upper right) crushes oversize or plus 2" fed to it from the Telsmith Scalping Screen (left). The crushed product is returned to the 30" x 87' primary conveyor by an 18" x 48'6" belt conveyor.

Telsmith 5' x 12' Triple Deck Pulsator (right) in structure over storage piles, sizes the gravel and sand. The 3 sizes of washed gravel are deposited over tunnel at grade level for truck loading from live storage, or by loader outside stock piles. The sand is flumed to a No. 8 Telsmith Sand Tank independent of main structure, for stock piling. 6-0

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C. & E. M. Photo
Flattened backslopes along roads in Norman County, Minn., to give a streamlined cross section have greatly reduced the amount of snow plowing.

Accounting System Saves County Funds

(*Continued from page 2*)

produced by photo off-set and provides a clear, effective statement of all operations.

Purchases and Bills

A feature of this simplified accounting system which might cause criticism, inasmuch as it gives an erroneous figure when a large purchase is made in one month, is however ironed out by the lower costs in succeeding months, and therefore the annual charge gives as true a picture as can be secured without an exceedingly elaborate accounting system. For example, fuel for the diesel power graders is charged to the grader whenever the 500-gallon tank at the local storage garage is filled. The entire charge for this is made as of the month when the purchase is made, and no further charge for fuel is made against that machine until the tank is refilled.

Gasoline is purchased at the lowest available wholesale rate, rotating the purchases among the different local distributors one month at a time. Each operator signs for the fuel placed in his equipment and the bills are rendered each month by the gasoline stations.

Other necessary purchases are made by the county employees, who telephone to the Engineer's office for a purchase order number and the authority to make the purchase. This is economical inasmuch as the county office can be called from any part of the county for 10 cents. Toward the end of the month the County Highway Department mails a bill for these purchases, with a copy of the purchase orders, to the vendor, who then must have the bill notarized and returned for payment at the end of the month. In this way bills are received by the end of the month for every purchase made during the month and warrants can be issued for their payment.

This method of handling purchases has been used for four years and has definitely proved its value. Special instructions addressed to "All Dealers" were sent out when this system was first placed in operation, giving exact instructions to dealers how to handle purchases made by county employees. A sufficient number of copies of these instructions are kept on hand, and whenever a dealer is dilatory in sending in his bills, another copy is sent to him.

Central and Storage Garages

Norman County is 864 square miles in area and has 598.75 miles of county road, of which 506.5 miles are graded and graveled, 59.0 miles are graded, 28.0 miles are graveled on a grade which is not standard, and 5.25 miles are unimproved.

The county garage at Ada serves as a repair shop for the County Highway Department and in addition there are storage facilities for one power grader at Twin Valley, at Gary for a power grader and a truck, at Shelly for a power grader, at Halstad for a power grader, and at Perley for a power grader. All of these storage garages are of concrete-block and stucco construction and are owned by the county.

The Ada Central Garage is also of concrete-block and stucco construction and measures 90 x 50 feet, of which the storage section is 24 feet wide x 90 feet long with wide overhead doors at either end, permitting the storage of six trucks or three trucks and three power graders.

At the right of the front of the garage is the office and a drafting room which is used by the engineering staff when not in the field. The field party and engineering staff consists of four men who handle all design for county roads. In the basement, beneath the office, is a hot-air heater with forced circulation and then behind the office is a locker room with shower and toilet. Between this and the repair shop is the parts storage room with wooden bins for the various parts for equipment which are stored pending the need for replacement. The repair shop measures 50 x 24 feet, has five large windows for natural light and a bench covered with sheet metal running down the entire

(*Concluded on next page*)

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"Without an overhaul job since October, 1938."
—*from letter dated January 19, 1942*

WHEN SHANNAHAN BROTHERS, Railroad and General Contractors, say that a shovel "has been subjected to extremely difficult work," it means something.

Yet this one has been used in their Quarry at West Riverside, California, since October 1938 "without an overhaul job of any nature."

Shannahan shovels use Macmillian RING-FREE exclusively!

The motor shown "has the original rings and bearings," they write us.

And read why they say they do not hesitate to recommend RING-FREE "for use in any heavy equipment." It's because:

"We have found through experience that our repair and overhaul bills are practically nil."

What RING-FREE has done for others, it can do for you. Write us!

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Painting of Tools Also Saves Money

(*Continued from preceding page*)

side of the shop. On this is a Black & Decker electric drill mounted as a drill press, and a bench grinder. In addition the equipment includes a blacksmith forge and anvil, a Smith portable acetylene welding outfit, a Marquette electric arc welder, a hand greasing outfit, a rack for the storage of welding rods, and a large frame rack for storing blacksmith steel.

The original garage used by the county, a wooden structure measuring 30 x 40 feet, is now used as a sign shop and for the storage of grader blades, tires, chains, etc. It is equipped with a spray paint outfit. The county spray-paints shovel handles and all other tools with a distinctive yellow. On discussing this with Orville A. Hunt, County Highway Engineer, he remarked, "It is surprising how few tools with this distinctive paint on them disappear from our trucks or from along the road when the men are working."

This spray-paint outfit is also used to paint all of the county snow plows as early in the spring as possible. They are stored adjacent to the county garage on wood blocks and make a very effective display. There is nothing much more unsightly than a snow plow which has been through its winter's battles and come out with the paint pretty well scraped from it by ice and snow. Prompt wire brushing or sandblasting and the application of a new paint coat makes the snow plows look shipshape and ready for the next year's work. Of course, paint should not be applied until after any necessary welding is done where weaknesses have shown up in the plows. This county makes a practice of reconditioning its snow plows in this manner.

Equipment Roster

The equipment used by the county for construction and for the maintenance of its roads includes an International 10-20 tractor with pull-type grader, a Caterpillar No. 9, two Caterpillar No. 11's, two Caterpillar No. 12 Auto Patrols, and an Adams 51 power grader. The truck equipment includes two Coleman four-wheel-drive trucks, a Walter and an Indiana truck, and a Ford V-8 with Marmon - Herrington all - wheel drive. In addition there is an Adams and a Stockland pulled grader, a belt-conveyor-type unloader, a two-wheel trailer and a Fruehauf semi-trailer.

The snow-plow equipment includes a Baker plow, a Bros plow and wing, a Viking plow, another Bros plow, and four plows and three wings made specially at the county shop. The feature of these plows is that they are much lighter in weight than the standard plows which the county has purchased, and have been found to operate more effectively with the county equipment. For example, the plow used on the Ford-Marmon-Herrington truck weighs only 800 pounds, which is much less than the size of the plow usually recommended for equipment of this type, but it has proved that it can handle the work as readily as the heavier plows and is much less of a strain on the truck equipment. At present the county is seriously considering the use of lighter equipment throughout, as its experience with the Ford - Marmon - Herrington truck has been that it has been able to work throughout the year economically while the larger four-wheel-drive trucks have been held for winter work alone.

Recently the county purchased a new D7 tractor, a 9-yard Carryall scraper and a second-hand 48-inch Caterpillar elevating grader which was offered for sale at a very reasonable figure by a local contractor.

Streamlining County Roads

During the summer of 1940, the backslopes on over 200 miles of county road were laid back flatter and the ditches widened to streamline the highway cross-section, thus aiding in snow-drift prevention. This method has been found very effective in state highway work, particularly in North and South Dakota, and generally in the Northwest where the advertising slogan "when it rains it pours" has been paraphrased "when it snows it blows". With a good strong wind behind a dry snow, a streamlined cross-section is very valuable as it saves snow plowing except in cuts.

How to get the highest contraction joint performance at the *lowest cost:*—

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CONTRACTION JOINTS

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Work with Any Machinery
Hold their Alignment

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"For use where power is not practical or available"
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For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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Distributors of Universal Crushing Equipment, all over the country, can be a big help to you at this time when equipment may not be easy to get. Their recommendations will help smooth out the rough road ahead. Too, they'll help you to get more from your present equipment and help you to keep it running. You need them—they need you; today and after the "duration."

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UNIVERSAL
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

The old and new bridges over the Big Biloxi River in Mississippi.

Old and New Bridges Over the Big Biloxi

On U. S. 49, approximately 15 miles north of Gulfport, Miss., on the road to Hattiesburg, Miss., is an interesting pair of contrasting bridges. One is a cable bridge built by Harrison County, Miss., in 1904 when cross-country highways served primarily to carry local horse-drawn traffic. When automobiles came into prominence, and before the time of our numerically marked Federal highways, the old cable bridge shown in the illustration served as a crossing of the Big Biloxi River for the Dixie Highway which ran from Gulfport, Miss., to Chicago, Ill.

Later a new bridge was built approximately 2 miles west of this location and was used for the crossing until U.S. 49 was marked. Then this new Federal route replaced the Dixie Highway through this part of southern Mississippi.

In 1938, the Mississippi State Highway Department relocated U.S. 49 over a new right-of-way with a better alignment and with this relocation the Big Biloxi River crossing came very close to where the old Dixie Highway had previously crossed the river. The new bridge shown was built in 1939 by Harbert-Cargile Construction Co., of Birmingham, Ala. The main cantilever span is 100 feet with two 55-foot anchor spans built on concrete piers. The approach spans are 30 feet, built on steel H-beam piling with concrete caps. The bridge deck is of concrete, 24 feet wide, supported by steel I-beams.

We are indebted to S. A. Tomlinson, Jr., Assistant District Engineer, Mississippi State Highway Department, Hattiesburg, Miss., for the data and illustration.

Solid Traffic Stripe In Calif. Now Broken

The former 4-inch solid stripe used by the California Division of Highways for marking the center line of all pavements has now been changed to a broken 3-inch painted traffic stripe in the interest of wartime economy, following the orders of Director of Public Works Frank W. Clark, according to *California Highways and Public Works*.

This change is understood to effect a saving of between 70,000 and 80,000 gallons of paint annually. The breaks will not exceed 25 feet in length and it is proposed further to use a broken double stripe. The change will be made legal by an amendment to "Regulation Adopting Distinctive Marking for State Highways Indicating No Driving to the Left Thereof".

Frank W. Clark, Director of Public Works, made the following statement: "The Department of Public Works realizes that the broken stripe will result in a slight reduction in the efficiency of our striping methods and reduce the conspicuous feature of the continuous traffic lines now in use. However, I feel that in the interest of wartime economy the change is fully justified. I solicit the fullest cooperation of the motoring public in giving the same strict observance to the broken stripe as it now gives to the continuous stripe."

The paint used in striping costs $1.30 a gallon, so that a minimum use of 70,000 gallons a year would mean a saving of about $91,000 to the State of California.

It will take more than taxes to lick the Axis. Buy U.S. War Bonds and Stamps and free the world of aggression.

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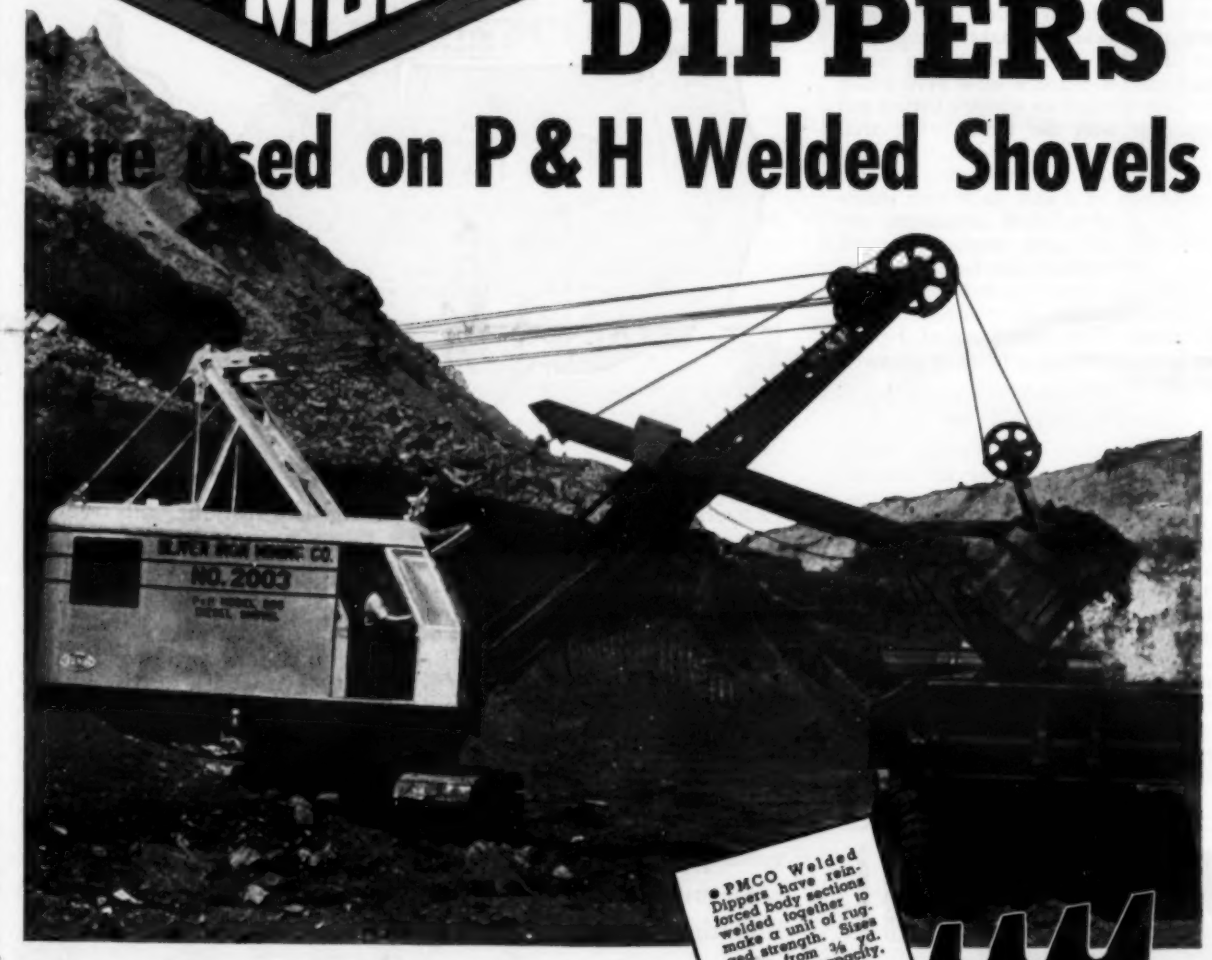
"One of the World's Largest Builders of Arc Welders"

PMCO

WELDED DIPPERS

are used on P & H Welded Shovels



• PMCO Welded Dippers have reinforced body sections welded together to make a unit of rugged strength. Sizes range from ⅜ yd. to 30 yd. capacity.

WELDED construction, now widely used in many ways to increase the efficiency of power shovels, is the feature of PMCO Welded Dippers that gives greater yardage capacity. In PMCO dippers weight saved by welded construction adds to the pay load as much as 30%. Investigate PMCO welded dippers when you buy your next shovel.

We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION
Established 1880
4710 West Division Street, Chicago, Illinois

Simplex UTIL-A-TOOL

Does Just About Everything!

Stop doing things "the hard way." Simplex Util-A-Tool will speed up your operations on all fronts. Saves time and labor in these days of faster war production.

Util-A-Tool pulls, pushes, spreads, lifts, clamps, straightens or bends, and removes wheels of any size or type quickly and efficiently. Also pinions, bushings and gears.

Use it as a regular 10-ton screw jack. Clamps and holds parts for welding or assembly on corrugated clamping lugs. Straightens structural or pressed steel members—holds down portable machines — pushes or spreads objects apart starting at 3½".

Sold by leading supply houses.

Templeton, Kenly & Co.
Chicago, Illinois

Better, Safer Construction Jacks since 1899.

Simplex Jacks
A better Jack for every job - many jobs for every Jack

Dealers' Contribution To War Construction

(*Continued from page* 15)

new uses of equipment. A particularly important contribution by the distributor to the smooth running of a job is his servicing of equipment. Practically all distributors have had, and in many cases have recently increased, service facilities for the proper maintenance, repair and replacement of spare parts for construction equipment. This prompt servicing and supply of parts saves many hours of valuable time which might otherwise be lost.

The distributor's assistance is not limited to contractors. Manufacturers as well benefit by the distributor system, for the manufacturer is saved much time, labor and delay by the distributor's preparations of quotations on equipment and in assisting contractors in ordering special equipment. Following up shipments to expedite delivery is a service to both the manufacturer and the customer and, finally, the service facilities which are so important to the contractor are equally helpful to the manufacturer. Such service as setting up, assembling and checking new equipment in the distributor's shop eliminates the need for a manufacturer's engineer or service man. This is especially important now, because the rapid expansion of the construction-equipment industry and the necessity for stepped-up production, plus the loss of trained personnel to Government service, have necessitated industry's calling in many trained field men for engineering and production work in their factories or for supervision in subcontract shops. As a result, a great contribution to speedy construction has been made by the distributors' taking over some of the field services formerly rendered by manufacturers.

In many cases, the Army and Navy have been assisted directly by equipment distributors in preparing specifications and in checking equipment costs on cost-plus-a-fixed-fee contracts. In this connection, the rental schedule prepared by the Associated Equipment Distributors has been of great value as a guide on rented equipment and has acted as a ceiling on rental rates.

Coordinated Activity Will Win

One of the great lessons learned by the tragedies of this gigantic world struggle is the value of coordinated activity. If Army, Navy and Air Force can act together, the chances of success are far greater than if one branch of the service must act alone. General MacArthur is even now in Australia for the very purpose of coordinating the facilities of the United Nations in order to drive the Japs back where they belong.

In a less spectacular but vital part of our war effort—that of construction for war—coordinated effort and activity are equally important. The equipment distributor can serve as a coordinating agent, helping to bring together the equipment, the knowledge of local conditions, the service facilities which must be at the disposal of the contractor for him to maintain the excellent record of speed and progress being made by the construction industry.

Based on a paper presented at the Twenty-Third Annual Convention of the Associated Equipment Distributors in Chicago, Ill.

One-Man Mobile Cranes

The Mobilcrane, made by the Osgood Co., Marion, Ohio, is mounted on a pneumatic-tired chassis and differs from the orthodox truck-crane in that it is powered with only one engine, and the operator, from his position at the levers in the revolving upper body, controls all the motions of the crane including traveling. Control of hoist, swing and travel motions is through air control with metering valves. Air brakes are provided on all wheels and a range of travel speeds bring a safe road mobility that readily gets the Mobilcrane from one job to another, over dirt roads, across rails, or anywhere that an industrial truck of comparable size can go.

Catalog No. 4128, recently issued by the Osgood Co., describes and illustrates various models. Copies may be obtained by writing direct to the manufacturer.

Lighting Engineer Dies

L. A. S. Wood, Chief Lighting Engineer of the Westinghouse Electric & Mfg. Co., died on May 6 in New York City, after a brief illness. Mr. Wood, who was born in London and came to the United States in 1911, had been associated with the lighting industry ever since he began his career and was a pioneer in promoting good practices in street and highway lighting, not only in this country but also in England.

STERLINGS don't flinch when war production demands wheelbarrow haulage on emergency schedules of 168-hour weeks . . . because Sterling Wheelbarrows are *engineered* to deliver "distinguished service." On small, everyday jobs, or on mammoth emergency miracles, STERLINGS simplify many material transport problems. Ask STERLING how, now!

STERLING WHEELBARROW CO., MILWAUKEE, WIS. Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 3754-

WHEN TIME IS SHORT

Performance is doubly important!

● Contractors and engineers always have to "work against time", but today's problems call for even greater speed and performance. We've simply got to get huge jobs done faster than ever so that it will not be too late—not only for our immediate needs, but for the America of tomorrow.

Euclid Self-Powered Hauling equipment is today helping to set new records in the construction of essential installations for our own government and industries as well as for those nations who are joined with us in the biggest job we've ever had. Day after day Euclids are hauling bigger loads faster on all kinds of jobs—and they're doing it with less time out for servicing and repairs. That's the kind of performance that's built into every Euclid, and it's one of the reasons why contractors depend on Euclids for the big rush jobs.

When repair parts are needed to keep Euclids rolling at peak performance, there are factory parts depots in Cleveland, Memphis, Hibbing and San Francisco, and Euclid distributors in every section of the country are ready and able to serve you efficiently.

The EUCLID ROAD MACHINERY Co. · Cleveland, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH . . ROCK . . COAL . . ORE

CRAWLER WAGONS · ROTARY SCRAPERS · TAMPING ROLLERS

Advertising Signs Regulated by County

Glynn County, Ga., Ordinance Which Effectively Opens Vistas Gives County Control Of Sign Type and Placing

✦ THE control of advertising along the highways should be the function of the state, but frequently it devolves upon the individual counties which have scenic attractions within their borders to protect them with county-wide regulations. As a leader among the coastal counties of Georgia, Glynn County has had a zoning ordinance covering advertising signs since 1938, with a comprehensive amendment dating from October 30, 1939.

The scenic beauty of Glynn County lies in its vast marsh areas famed in history as the scene of bloody battles between the Spanish and the English, and in literature through the writings of Sidney Lanier. These great expanses of lush green interspersed with the blue waters of the many inlets and the Turtle River had been desecrated by innumerable advertising signs, many of which were in rainbow hues, home-lettered and devoted largely to the merits of locally-grown pecans sold at various gasoline filling stations.

Designations

Three areas of scenic beauty in Glynn County, where no permits whatsoever will be granted for advertising signs, have been set apart at various times. On September 12, 1938, the Glynn County Planning Board designated the marsh areas, including adjacent high lands for a distance of 100 feet beyond the extreme high-water mark, along the highway south of Brunswick at several river crossings as areas of special scenic beauty in which no permits for advertising signs would be granted. Similarly, on June 14, 1939, the Board designated St. Simons and Sea Islands as areas of scenic beauty and historic interest where no advertising signs would be permitted except on actual business structures. Then, on October 30, 1939, all marsh areas along state and county highways were designated as areas of scenic beauty where no permits for advertising signs would be granted.

Character of Signs

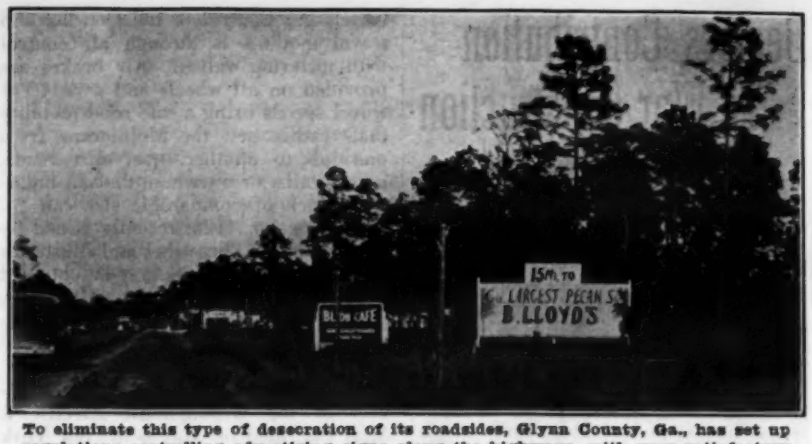
Permits are required from the Glynn County Planning Board for all advertising signs placed outside of buildings. If a sign for which a permit is granted is not erected within thirty days from the date of the permit, the permit is automatically void. A sign placed within the open drive-in area of a filling station or other structure is considered located outside of a building. Similarly, advertising painted on a structure is considered an advertising sign and is subject to the regulations. No signs are permitted which involve motion or rotation or display intermittent lights.

As a means of increasing the safety of the highways, advertising signs must not use the word "stop" or "danger" prominently displayed, or imply the requirement of stopping, or existence of danger, or be a copy or imitation of any official highway signs.

The ordinance requires that all outdoor advertising signs must be kept neatly painted, properly braced and supported, and the foundation kept clear of weeds. Such signs as do not receive the proper care may be removed by the Planning Board. Further, any advertising sign that is non-conforming or that has been damaged by fire, storm or any other cause to an extent of 50 per cent of its value, as appraised by the Planning Board, must not be erected or replaced but must be removed as directed by the Board. A sign that is blown over is considered more than 50 per cent damaged if not restored by the owner after 14 days due notice, except that in the case of extreme storms or hurricanes the Planning Board reserves the right to extend the time in which a sign may be replaced.

The Planning Board grants permits for temporary signs for special purposes in the interest of public welfare. The erection or failure to remove, after the owner has received due notice, of any advertising sign that is in violation of

(*Concluded on page 42*)



To eliminate this type of desecration of its roadsides, Glynn County, Ga., has set up regulations controlling advertising signs along the highways, with very satisfactory results.

HERCULES

KEEPS 'EM DUMPING

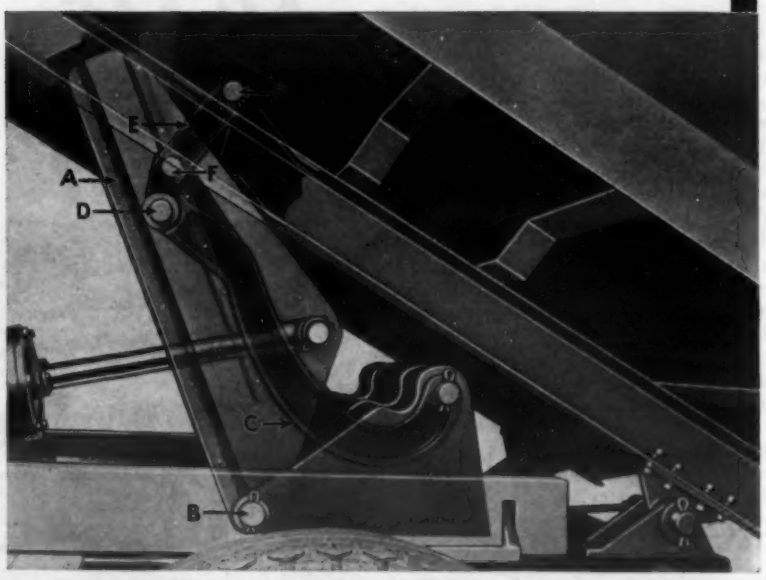
Hercules dump truck equipment is built to do a big job in a hurry. Hercules Center-Lift SPEEDRAULIC Hoists are available with 6", 7", 8" or 10" cylinders for handling the full capacity of the truck chassis. Hercules hoists lift in the exact center of a 10 ft. body. By exerting power ahead of load center, minimum lifting effort is required. This in itself increases the hoist capacity, and requires only lowest oil pressure. The bridge type lift arms prevent cramping and strain on body and chassis.

Hercules SPEEDRAULIC Hoist Model 10X (10" cylinder) and Hercules Type RB rock body of 13 cu. yd. capacity. Mounted on 178" wheelbase chassis. All Hercules hoists are controlled by a Balanced Piston Valve. This valve mechanism is independent of oil pressures, and cannot bind.

HERCULES HOIST LIFTING ACTION

Pivoted load arms C carry rollers D which ride on the floor A of the lifting arms. Connection between load arms C and body is made by links E which are pivoted to the arms at F and to the body at G.

When dump body is down in road position, the floor of the lift arms lies parallel with body and truck frame. Rollers D rest on lift arm floors at a point much closer to pivot B than shown by illustration of partly raised position. This forms a short and very powerful lifting lever at the start of the lift. (Lift arms are tilted by movement of the piston rod and cross head to which they are connected). As lift arms tilt, the rollers D rapidly change position, reaching the extreme outer end of the lift arms. The rapid movement, as rollers near end of lift arms, requires neither more power nor more oil pressure. Shoulders inside lift arm plates are provided over the rollers, preventing backtilting of body. There are no chains or gadgets.



Hercules SPEEDRAULIC Hoists are designed to transmit a maximum amount of power with minimum effort. All Hercules Hoists stop automatically at end of stroke, and are operated by means of either dash controls or conventional floorboard levers. No part of hoist extends below chassis frame. SPEEDRAULIC Hoists mount with bodies of any length and capacity.

HERCULES STEEL PRODUCTS CO.

GALION, OHIO

HEET-MASTER—SAVES 50% ON FUEL

HEATS TAR & ASPHALT TWICE AS FAST

Send for Bulletin No. 196 HEET-MASTER Kettles for

FREE on Contractors

AEROIL BURNER CO., INC.

5775 Park Avenue, West New York, N. J.

Chicago San Francisco Dallas

Construction Funds Used to Purchase New Right-of-Way

Many highway officials have expressed a fear that accumulations of gas tax funds which will exceed the amounts that can be expended for maintenance, and which can not be used for construction, will be confiscated for the general expenses of the state. This will not be possible in those states where constitutional amendments have been voted by the taxpayers, although you may rest assured that attempts will be made to do so by the politicians.

Realizing that the need for new rights-of-way for post-war construction will require extensive expenditures, the State Highway Board of Vermont is continuing the purchase of new right-of-way at those locations where post-war transportation problems will inevitably require better alignment and wider highways. Thus, part of the funds which can not be expended now for highway construction are being safely invested in the preparation for that back-log of construction to care for unemployment after the peace has been won.

Vermont expended $161,094.04 in 1940 and 1941 for the acquisition of rights-of-way. Highway department records show that right-of-way costs for completed projects in Vermont, during the last two years, according to the *Nerba*, were subdivided into the following items: 1. Purchase of land and buildings, 42 per cent; 2. Damages, 20 per cent; 3. Fencing, 22 per cent; 4. Drainage, 2 per cent; 5. Engineering and recording, 9 per cent; 6. Miscellaneous, 5 per cent. Right-of-way expenditures were approximately 5 per cent of total construction costs for the two-year period.

Vermont has set an example of planning which other states may well follow. Think of the satisfaction of going ahead with construction over a right-of-way that is ready for its entire length, without the headache of delays because this owner or that won't come across, or the title to another parcel of land is dubious. Perhaps the construction man's millennium is ahead, just around the corner of Peace.

Newer Alloy Steels For Alternate Uses

A remarkable 143-page pamphlet has been issued by American Iron and Steel Institute, 350 Fifth Avenue, New York City, in its "Contributions to the Metallurgy of Steel—No. 5". This booklet, prepared at the request of the Office of Production Management, is a very careful study of "Possible Alternates for Nickel, Chromium and Chromium-Nickel Constructional Alloy Steels". The use of alternate steels in construction and construction equipment may make necessary changes in established methods of fabrication or heat treatment procedures or both, or may even make necessary changes in engineering design. Some types of steel are fabricated by torch cutting, bending, forming, dishing, drawing and other similar operations and the effect of these must be weighed carefully in selecting alternate steels. For some uses a specific amount of a given element or group of elements is indispensable, while for other uses it may be more advantageous to make use of small quantities of several elements, thereby effecting conservation of all.

The report does not purport to present the most convenient alternates possible for one type of industry; rather, its purpose is to present certain types of steel which can serve the broadest possible field with the least technical complications.

Part I of the report discusses the general problem; Part II, Possible Alternates for the Standard Carburizing Grades of Steel; Part III, Possible Alternates for the Semi-Thorough Hardening Steels of the 0.30 per cent Carbon Class; Part IV, Possible Substitutes for the Thorough-Hardening Steels of 0.35 per cent Carbon and Higher; and Part V gives data on standard steels and standard methods for sampling for check analyses and standard variations from specified chemical limits.

This report is the result of a careful study by a large informal committee of metallurgists selected from the technical committees of the American Iron and Steel Institute, the Society of Automotive Engineers, and interested manufacturers. The committee held several conferences and performed certain experimental work for the purpose of studying possible alternates for chromium and nickel constructional alloy steels. This bulletin is a valuable contribution to our war effort in the conservation of the scarcer alloy metals. Copies may be secured from the American Iron and Steel Institute. Price: 50 cents.

● Throughout the many years of SCHRAMM compressor operation they have been tops in performance; so now when economical, dependable and speedy performance is necessary in the present Victory drive, SCHRAMM is prepared to answer the call.

They are gasoline, diesel or electric powered and range in size from the small 20 to the 420 cu. ft. actual air capacity.

Send for Catalog 42-P

SCHRAMM, INC. WEST CHESTER, PA.
DEALERS IN PRINCIPAL CITIES

WIRE ROPE LASTS LONGER WITH PROPER CARE

8 tips on lubricating WIRE ROPE

You'd have to look a long way to find a piece of equipment able to stand up under the terrific abuse which wire rope handles every day as a matter of course. Just because wire rope *can* take it, however, is no reason to subject the rope to abuses which could be avoided.

Take lubrication, for instance. You wouldn't think of running your car without plenty of oil in the crankcase. Wire rope, too, is a machine. In action, its many individual wires move relative to each other and twist around their own axes. To protect these "bearing" surfaces from rust and from wear, follow the simple rules outlined below. You'll be well repaid in longer service.

1. Clean wire rope carefully before lubricating it. Remove grit, dirt and other foreign matter with kerosene or gasoline and a stiff brush. Another method is to pull the rope through a tightly-wrapped swab.

2. If the rope has been working in a wet atmosphere, it may be coated with hydrated rust—a slimy film that cannot be removed until the rope is *thoroughly* dried out. To apply oil or grease on top of hydrated rust is simply wasted effort.

3. Choose a lubricant which is suited to the size and construction of rope, and to the working conditions. A stiff rope, with fewer, larger wires, requires a heavier lubricant, in general, than a more flexible rope with a greater number of wires.

4. When applying heavy lubricants to wire rope, thin them out by heating, so as to get the desired penetration. Use an ordinary metal vat or box with a gas flame under it. Pull the rope slowly through the hot lubricant. A sheave, partly submerged in the vat, will hold the rope down so that the lubricant can penetrate more readily.

5. If you are not using a heated vat, or a special drip-oiling device, the lubricant may be applied with an oil can or a paint brush, dipped in the lubricant.

6. Don't just apply any-oil-that's-handy to your wire rope. Some lubricants have an acid base and will actually eat into the wires, thus seriously damaging the rope. Be certain that the lubricant you apply to your rope is the correct one—that it won't "fight" with the lubricants already in the rope.

7. Ropes that operate at elevated temperatures require a lubricant that will hold its body at the working temperature. Use a fairly heavy lubricant, heat it above the working temperature of the rope, let it penetrate completely among the wires. It will cool and thicken at room temperature. But in service, the heat will thin out the lubricant to the right consistency.

8. Never let your wire rope rust or become dry of oil. Watch it carefully in service. Experience will show you how often to lubricate for best results. Every type of wire-rope job presents its own lubricating problem. If the load is heavy—if the rope works at high speed—bends frequently around sheaves—is exposed to moisture, grit or corrosive fumes—be particularly careful about lubrication. Remember, wire rope is a machine, and machines don't last long without proper lubrication.

BETHLEHEM STEEL COMPANY

Maintenance Problems In New England States

(*Continued from page 7*)

type, about 20 per cent is located on the strategic network, and all of the bituminous treatment of shoulders, undertaken up to this time, is on this system.

Of the entire state highway system, approximately 6,000 miles is of the surface-treated gravel type. Although a large percentage of this mileage at the present time is in fair condition, surfaces of this type require almost constant maintenance, which normally involves the use of a considerable quantity of bituminous material; otherwise the large expenditure that has been made in the past to develop the present thickness of material is lost.

The normal expenditures for construction and maintenance on Maine state highways from 1932 through 1941 and similar expenditures on bridges are shown in the two following tables.

ANNUAL EXPENDITURE ON MAINE HIGHWAYS

	Construction	Maintenance
1932	$ 8,999,332.04	$ 2,776,519.32
1933	4,969,403.82	1,915,862.71
1934	7,316,569.59	2,726,119.20
1935	4,807,320.66	2,085,997.20
1936	5,343,042.27	2,287,627.68
1937	5,523,400.53	2,689,598.61
1938	5,247,100.92	2,543,570.08
1939	4,566,170.64	2,212,802.39
1940	4,861,713.18	2,362,904.89
1941	4,503,206.32 (Est.)	2,500,000.00
	$56,137,209.97	$24,101,002.08

ANNUAL EXPENDITURES ON MAINE BRIDGES

	Construction	Maintenance
1932	$ 1,582,513.85	$ 141,550.11
1933	620,548.12	139,636.12
1934	904,991.03	169,739.61
1935	917,356.43	175,075.07
1936	1,675,820.93	210,471.78
1937	2,874,894.42	235,328.10
1938	1,376,641.30	161,691.94
1939	1,600,667.82	168,618.20
1940	757,152.99	248,308.47
1941	1,025,556.52	151,310.95
	$13,336,143.41	$ 1,801,730.35

Grand total of highway and bridge construction, $69,473,353.38.
Grand total of highway and bridge maintenance, $25,902,732.43.

New Hampshire

The reduction in availability of bituminous material for maintenance operations must have been foreseen by Commissioner Frederic E. Everett and the members of the Maintenance Department of the New Hampshire State Highway Department under LeRoy F. Johnson, for they have devised a treatment method that resurfaces and revivifies 12 to 15 miles of 20-foot roadway a day with one outfit working from 7:00 a.m. to 7:00 p.m., and they started their 1942 program early.

C. & E. M. Photo
A state-owned Etnyre distributor on an Autocar chassis applying tar in the annual surface-treatment maintenance program in District 8, Connecticut.

Commissioner Everett stated in our interview that most of the roads of the New Hampshire trunk-line system are of gravel or waterbound macadam which have been treated annually with about 1,400,000 gallons of tar while 2,700,000 gallons have been used on state-aid roads. The trunk-line system comprises 1,423 miles and the state-aid system 2,155 miles, making a total of 3,578 miles of state highway which must be maintained the year round. Between 60 and 70 per cent of this is surface-treated each year. An annual contract is awarded for the tar necessary for this maintenance operation while the sand or fine gravel required is secured by force account. A tar with a specific viscosity of 20 at 50 degrees C. is applied at the rate of 0.2 gallon per square yard and covered with sand at the rate of 25 pounds per square yard, bladed and honed until thoroughly mixed, spread on the surface of the road, and then finally rolled.

Shoulders of concrete roads are built of gravel 3 feet wide and are treated with tar for 2 or 3 feet, depending on the traffic intensity on that particular highway. The initial treatment is 0.4 gallon per square yard followed by sanding and then a second application of 0.2 gallon per square yard similarly sanded. After this, a treatment of 0.2 gallon per square yard is given every two or three years.

New Hampshire is ready to adapt itself to the restricted availability of bituminous materials for its all-important surface-treatment maintenance program.

(*Continued on next page*)

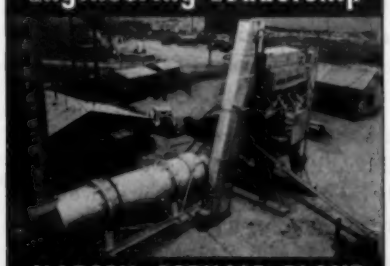
Built for Battle!

● The WALTER TRACTOR TRUCK was never designed for smooth highways, easy grades and moderate loads. Walter Four-Point Positive Drive, with automatic lock differentials, suspended double reduction drive and tractor-type transmission, fit it for snow removal and gruelling off-the-road work. Smashing heavy snowdrifts, handling the toughest jobs of road building and maintenance, hauling artillery over broken terrain, pulling enormous trailer loads in coal and ore mining are just a few of its daily tasks. Where loads are heaviest and roads bad — there you'll find WALTER TRACTOR TRUCKS setting new performance records, in all kinds of weather!

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave. • Ridgewood, Queens, L. I., N. Y.

WALTER
4-Point Positive Drive
TRACTOR TRUCKS

Engineering Leadership



MADSEN ASPHALT PLANT EQUIPMENT offers greater portability—all units are within 8-feet overall width and of a height which when loaded on a low bed trailer is within 13'6" from ground to top—fewer chain drives—and many real productive features. No other plant offers all the features found in this Madsen unit, backed by over 25 years' experience.

When you buy, or contemplate buying new asphalt plant equipment, be sure you look into the plant that leads the way Out West.

MADSEN
IRON WORKS
HUNTINGTON PARK CALIFORNIA

Vermont Maintenance On "Day-to-Day" Basis

(*Continued from preceding page*)

Vermont

With Vermont state highways in the best condition they have been for years, H. E. Sargent, Commissioner of Highways and Chief Engineer of the Vermont Department of Highways, plans to take care of maintenance on a "day-to-day basis" for the duration, as bituminous materials are made available. Bids for bituminous material were taken this year by districts as usual but on the basis of possibility of delivery rather than actual requirements. No bids were received for the three northern districts of the twelve comprising the state, but arrangements have been made to transfer material from the other districts by paying the freight differential.

Mr. Sargent reported that it was obvious that with a 50 per cent cut in gas-tax income, which was inevitable with the rationing of tires and automobiles, there would be only enough money for the maintenance of state highways and state-aid roads. All of the usual allotments of state-aid money for town highway construction have been postponed.

Since Vermont is famous for its granite, there seems to be a general impression that this monumental stone underlies all surface material. Such is not the case, for a large part of the state is the silt and clay comprising the subgrade throughout the Connecticut River Valley. To overcome this, Vermont has progressively increased the thickness of its gravel base under all roads from 6 to 12 to 18 and even to 24 inches in bad locations. It is now reaping the harvest of this forethought, because Mr. Sargent reports that frost boils were negligible on Vermont highways this past spring. The few "bump" signs which had to be installed to caution traffic were due to slight settlements at new culverts.

The normal method of maintaining Vermont roads, which are chiefly bituminous-surfaced, is to apply a hot tar or heavy cut-back, an RC-4 or RC-5, at the rate of 0.25 gallon per square yard on bituminous surfaces or 0.2 gallon per square yard on old concrete pavements. This is immediately covered with ¾-inch pea gravel or stone chips at the rate of 130 tons per mile of 20-foot road. This treatment lasts from 2½ to 5 years before it is necessary to repeat it. It was formerly the practice to stock this material in small piles along the road to be treated, but it was found that traffic and pedestrians scatter so much of the material that there was a tremendous waste. The material is now stockpiled centrally, from which the trucks are loaded and the material distributed over the road by chip spreaders. The normal timing of the maintenance operations is to start blading shoulders about April 15 and to begin the application of the bituminous material about May 1 and continue it throughout the season until all projects are completed.

This year the emergency conditions mean a considerable change in operations. Everything has been planned to take advantage of a shipment of bituminous material just as soon as the Commissioner is notified of its shipment. In the first place tank cars must be unloaded within 24 hours. To take care of this situation the state has been able to arrange for some storage tanks and will take full advantage of the available tanks belonging to the larger oil and tar companies. In some districts it will be necessary to take the patrolmen from their regular work for a week at a time and put them on the bituminous maintenance operations. The 1½ to 2-inch mixed-in-place resurfacing which makes use of the old consolidated subgrade and surface as a base for the new surface will be discontinued entirely until times become normal as far as highway maintenance and construction is concerned.

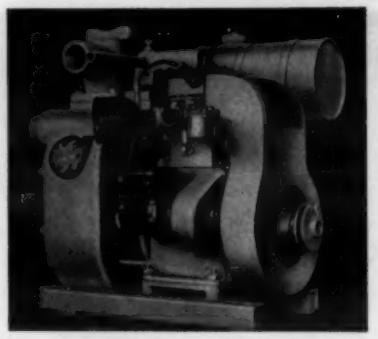
The engineering force of the Vermont Department of Highways normally is about 100 men, but now, due to the demands of defense construction and the call of our military forces, the staff is down to 48 and going lower each week. Since construction has come to a standstill, F. C. Coates, Construction Engineer, has been transferred to take charge of maintenance operations in the absence of a regular appointee for this work.

Massachusetts

The normal method of maintaining state highways in Massachusetts is to surface-treat the bituminous macadam about once in eight to ten years, using from 0.25 to 0.33 gallon per square yard of cut-back asphalt or asphalt emulsion covered with ¼ to ½-inch crushed stone at the rate of 25 to 30 pounds per square yard. Practically the same method is used for bituminous concrete at the same intervals, and also for gravel or water-bound-macadam surface-treated roads at 5-year intervals.

The dragging of gravel shoulders is gradually being eliminated by replacing the gravel shoulder with a 2-inch bituminous-concrete mix by force account. These will be treated every five years, or at longer intervals, the same as the bituminous macadam.

(*Concluded on page 54*)



2" High-Pressure Pump

Light weight, high-capacity, self-priming

Delivers 65 gallons per minute against 50 lbs. pressure, or 50 gallons per minute against 65 lbs. pressure. Suitable for jetting piles, supplying water to concrete mixers through long pipe lines against high pressure.

Ask for bulletin describing high-pressure pumps.

Made by

MARLOW PUMPS

Ridgewood New Jersey

Patent Rights

Date	Number
8-14-28	1,680,923
6-11-29	1,716,872
2-11-30	1,746,570
4- 7-31	1,799,269
11-10-31	1,831,153
2-20-40	2,190,748

Also Foreign Patents

WILSTA-FORM EXTERNA

Trade Mark

Patent Rights

Date	Number
6- 1-27	1,586,991
4-24-28	1,667,253
3-29-32	1,851,339
4-24-28	1,667,252
10- 7-29	Re.17,452
7-21-36	2,048,151

Other Patents Pending

"First Call on Defense Jobs"

WILLIAMS "SIMPLEX" CLAMPS For Commercial Buildings, Sewage Disposal Plants, Filtration Plants, Architectural Concrete, Etc.

WORLD'S LARGEST OFFICE BUILDING USES WILLIAMS "SIMPLEX"

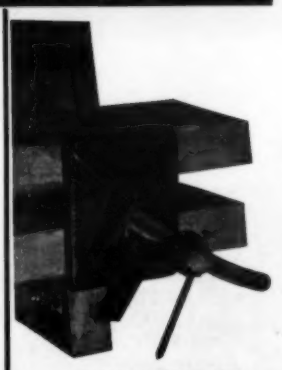
OUR WAR DEPT. HEADQUARTERS

OK'd BY ENGINEERS (Not a "Hay Wire" Tie) 7200 LBS. WORKING LOAD. 9000 LBS. ULTIMATE AT THE COST OF No. 9 WIRE.

NO "BREAK OFF LOSS" WITH WILLIAMS TIES

WILLIAMS "VIBRA-LOCK" CLAMPS For Dams, Bridges, Heavy Construction, Battered Walls, etc.

Number	For Inner Rod Size	Acme Thd Waler Rod Length	Bracket Size	Ordinary Mild Steel Maximum Allowable Working Load to Elastic Limit (Not Used)	USING WILLIAMS HIGH TENSILE RODS: Tensile Strength Ultimate	USING WILLIAMS HIGH TENSILE RODS: Maximum Allowable Working Load to Elastic Limit	Price Per Set 2 Waler Rods 2 Wing Nuts 2 Brackets
US-VL-1	⅝"	18"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	**7,200 Lbs.**	$1.25*
US-VL-2	⅝"	24"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	**7,200 Lbs.**	1.38
US-VL-3	⅝"	30"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	**7,200 Lbs.**	1.50
US-VL-4	⅝"	36"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	**7,200 Lbs.**	1.60
US-VL-5	½"	20"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	1.55*
US-VL-6	½"	20"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	1.65
US-VL-7	½"	24"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	1.65
US-VL-8	½"	24"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	1.75
US-VL-9	½"	30"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	1.90
US-VL-10	½"	36"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	**12,800 Lbs.**	2.05



WM.'S VIBRA-LOCK CLAMP REMOVAL

Locked to Waler Rod by 20 or 30 penny Spike engaging slot in rear of Wing Nut and cross drill in Waler Rod.

WILLIAMS "SUPER-Hi" TENSILE TIE RODS (Elastic Limit or Working Load 4 Times as High as Mild Steel)

INEXPENSIVE U. S. STANDARD THREAD RODS

(2) ⅝" diam. U. S.—16 thd. 9,500 lbs. Ultimate Tensile 7,500 lbs. Working Load per Rod			(3) ½" diam. U. S.—13 thd. 16,500 lbs. Ultimate Tensile 13,000 lbs. Working Load per Rod		
LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width
12" or less	$ 3.00*	15" or less	12" or less	$ 4.00*	15" or less
13"	3.25	16"	13"	4.33	16"
14"	3.50	17"	14"	4.67	17"
15"	3.75	18"	15"	5.00	18"
16"	4.00	19"	16"	5.33	19"
17"	4.25	20"	17"	5.67	20"
18"	4.50	21"	18"	6.00	21"
19"	4.75	22"	19"	6.33	22"
20"	5.00	23"	20"	6.67	23"
21"	5.25	24"	21"	7.00	24"
22"	5.50	25"	22"	7.33	25"
23"	5.75	26"	23"	7.67	26"
24"	6.00	27"	24"	8.00	27"

*Rods under 12" in length kurled to prevent turning in concrete

WILLIAMS WALER SUPPORTS

With Stops for 4" or 6" Walers as shown.

$8.50 Per 100 State Size Waler

Eliminate

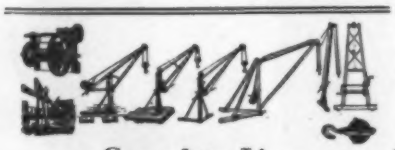
1. Nailing Walers together.
2. Building scaffolding to install clamps.
3. Placing and replacing wooden cleats.
4. May be rotated out of the way when storing sections.
5. No stepping on nails from wood cleats left lying around.

Immediate 24-hr. Service **PHONE 3-3823** Day or Night

(Wire or phone *Collect* on orders of $100.00 or more)

WILLIAMS FORM ENGINEERING CORP.

Box 925, Madison Square Station GRAND RAPIDS, MICHIGAN



Complete Line of **DERRICKS** *and* **WINCHES**

SASGEN DERRICK CO.

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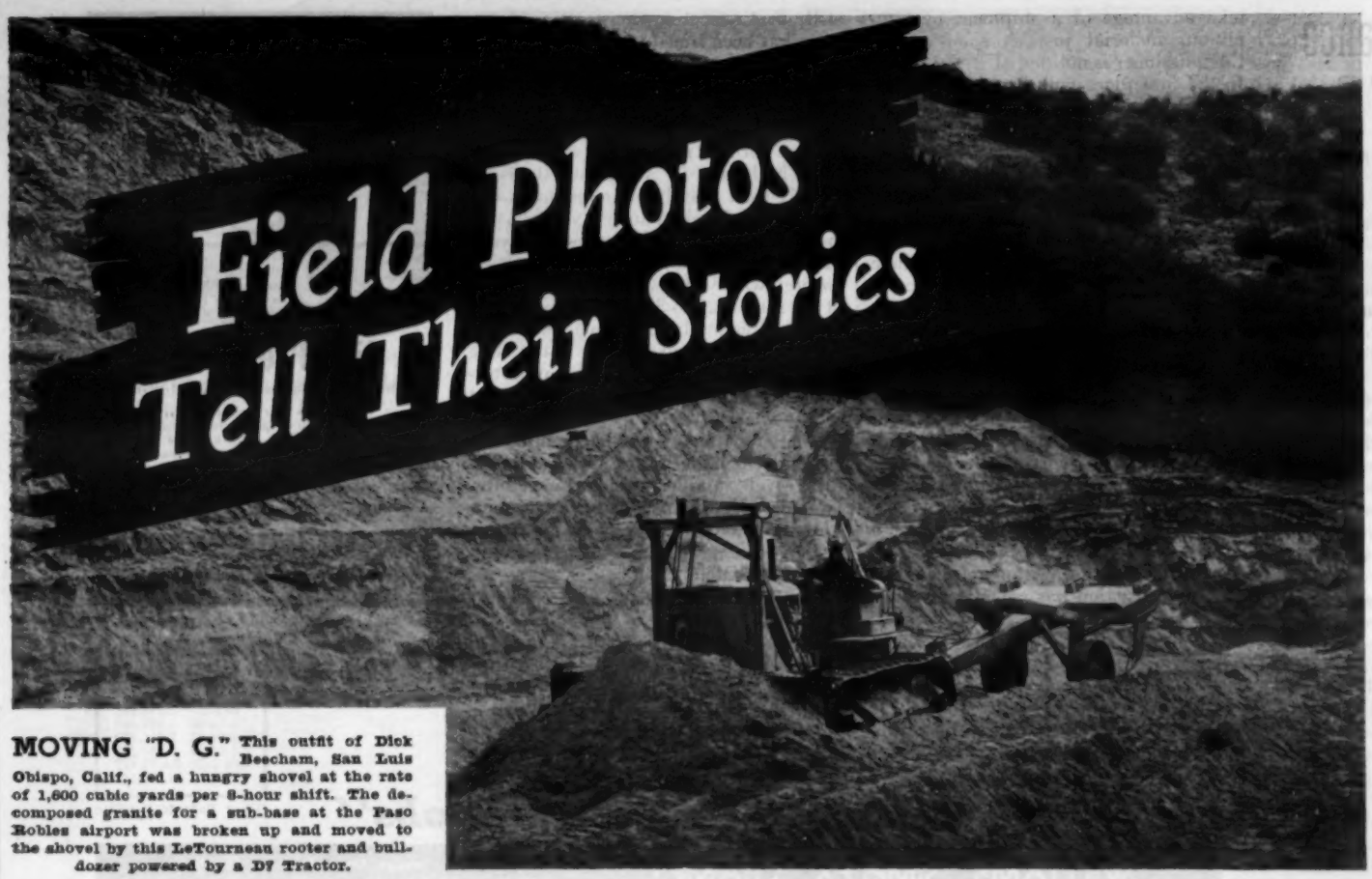
Field Photos Tell Their Stories



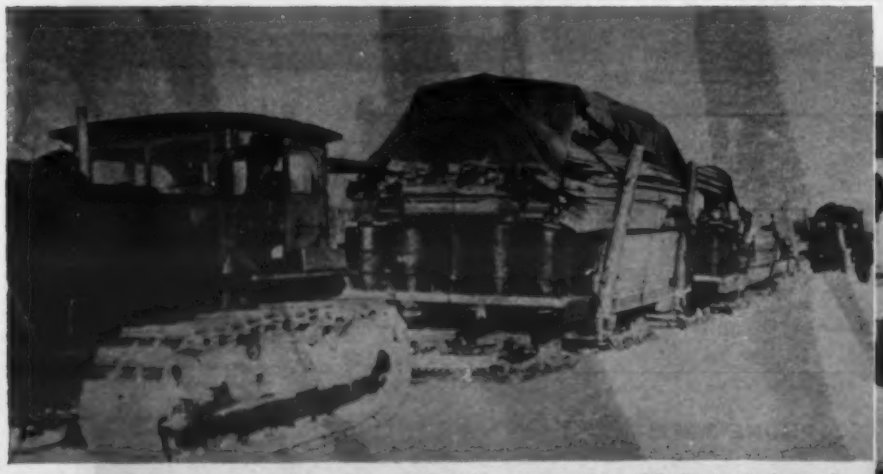
MOVING "D. G." This outfit of Dick Beecham, San Luis Obispo, Calif., fed a hungry shovel at the rate of 1,600 cubic yards per 8-hour shift. The decomposed granite for a sub-base at the Paso Robles airport was broken up and moved to the shovel by this LeTourneau rooter and bulldozer powered by a D7 Tractor.

Bureau of Reclamation Photo

TOO BIG to be hauled by [illegible]-foot diameter x 20-[illegible] stock section for Shasta was welded [illegible] shop a mile downstream, moved [illegible] special trucks and lifted into pla[illegible]way.

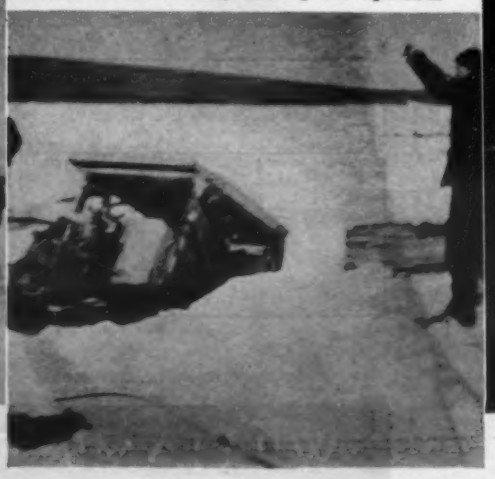
CIRCUS. The famous Ring[illegible] & Bailey show uses [illegible] fold[illegible] ing crane for handling the hug[illegible] canva[illegible] for the "big top" and, with the [illegible] down[illegible] for towing circus trucks and [illegible] bad spots in the road or on the [illegible].

ALASKA RACE. In a race against time U. S. Army Engineers engaged in constructing the pioneer road for the Alaska Highway beat the ice break-up in Peace River. Giant Caterpillar diesel tractors, equipped with bulldozers to help lick the northern badlands, were shipped by rail from Peoria, Ill., to the end of steel at Dawson Creek, B. C. There the equipment was loaded on trailers and the tractors hauled them over the frozen water of the mile-wide Peace River and thence to Fort St. John, 60 miles away, where the drive toward distant Fairbanks, Alaska, started. This new road which will be approximately 1,500 miles in length will be the world's outstanding highway construction project and a vital link in the United Nations Victory Program.



TRACTOR TRAIN of three D8's each pulling three sleds with 20 to 25 tons of freight start from Nenana, Alaska, for a CAA project at Lake Minchumina, breaking trail through a trackless wilderness as they went.

SINKING. Crossing Lake Minchumina, one tractor broke through, sank to the bottom, ducking the operator.

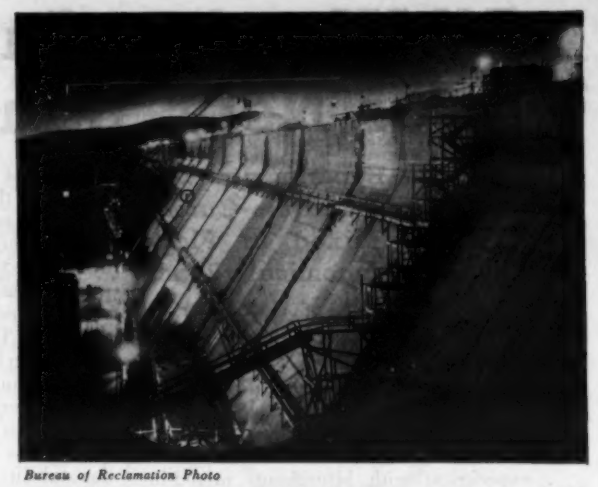


INVESTIGATION. Morrison-Kn[illegible] pro[illegible] emergencies [illegible]rat[illegible] low, divers attached cables to the tracto[illegible] fr[illegible]

SABOTEURS. W. H. Cobb of the United States Rubber Co. points to a group of public enemies of rubber whose malevolent activities must be stopped to guard our dwindling store of rubber so necessary for our industrialized war effort.

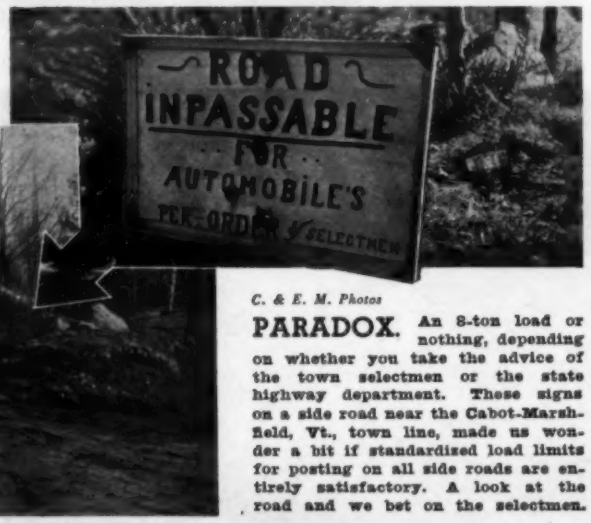
Bureau of Reclamation Photo

POWER. Joe O'Brien, jackhammer operator, drilling high on the west abutment of Shasta, contributes his bit to the construction of this dam to supply more power for the war program.



Bureau of Reclamation Photo

TOPPING OFF. Well-floodlighted, work at night rushes Friant Dam in California, to virtual completion in record time. The picture shows the top third of the dam and a worker, in the circle.



C. & E. M. Photos

PARADOX. An 8-ton load or nothing, depending on whether you take the advice of the town selectmen or the state highway department. These signs on a side road near the Cabot-Marshfield, Vt., town line, made us wonder a bit if standardized load limits for posting on all side roads are entirely satisfactory. A look at the road and we bet on the selectmen.

C. & E. M. Photo

MOWING the 20-foot center strip on U.S. 5 near East Hartford, Conn., A pair of these Jacobsen power mowers are hauled out by truck each morning and together they cut from 3 to 4 miles of center strip in a 9-hour day.

SAVINGS. Robert J. Dill moved his four Super C Tournapulls from Mobile, Ala., to Jacksonville, Fla., 460 miles over the highway, under special permits limiting travel to daylight hours, in four days, and saved about $1,000 compared with shipment by rail.

COMING UP. A tripod, pulleys and other apparatus were rigged up and pulled the big tractor and the freight up on ramps made of long timbers resting on cross braces at the upper end, frozen into the ice.

provided a diving suit for just such
ratures from 10 to 25 degrees be-
freight to pull them out.

FLOATED. The tractor was towed to shore, pushed to camp and cleaned, requiring only new gaskets to start out again.

All-Weather Surfaces For Nebr. Sand Roads

Extended Experiments with Slow and Medium-Curing Asphalts Mixed in Place Provide Economical Roads

✦ TO provide all-weather road surfaces in sparsely populated areas where the existing roads were very unsatisfactory and where natural road-building materials, other than sand, were not available, the Nebraska Department of Roads and Irrigation in 1928 began to experiment with bituminous mixed-in-place construction, using the sandy soil of the existing road and liquid asphaltic materials. The aim was to find the most economical means to improve these roads permanently at a cost commensurate with the traffic carried.

The bituminous mixed-in-place method of treatment offered possibilities. The first experiments showed promise but also indicated the necessity for obtaining definite information on the details of construction and on the performance of various combinations of bituminous materials and sand.

Asphaltic Materials

Slow-curing asphaltic materials of the type then being used with graded aggregate, as well as medium-curing materials, were tried out experimentally to determine their relative merits as binders for the poorly graded sand. Neither material alone was particularly satisfactory at first.

The slow-curing material did not provide the bond required for stability and it became necessary to increase the mechanical stability of the sand by the addition of fine inert soil which served as a filler. This modification of the original mixture produced adequate stability that was relatively independent of the bituminous material in that it was not greatly affected by changes in temperature.

The medium-curing asphaltic material was relatively slow in developing its ultimate binding property. During the early life of the experimental road, the sections containing this material had stability adequate for moving traffic but not for static loads. The upper portion of the mixture developed a crust as the volatile portion of the asphaltic material decreased, but volatile material below the surface was dissipated very slowly. As a result, this portion remained somewhat plastic and readily susceptible to deformation under load. This condition resulted in extensive surface cracking that gave the sections an unsightly appearance but did not seriously impair their serviceability. In time, the viscosity of the bituminous material increased as did the stability of the mixture so that surface cracking stopped.

The experiment provided information not only on possible methods of improving the sandy soil roads but also on the manner in which construction should be carried out. Most of this information developed by the experiment has already been incorporated in the State's specifications.

Design and Construction

In addition to emphasizing the necessity for using efficient equipment and for providing adequate supervision and control that are so essential in the low-cost types of construction, the experiment brought out a number of facts relative to design and construction, the more important of which were as follows:

1. The stability obtained with the cut-back asphalt was considerably greater than that obtained with the slow-curing road oil but neither material provided satisfactory stability with the natural blow-sand.

2. Lack of stability resulted in excessive surface cracking of the cut-back sections and caused the road-oil sections to remain in a loose uncompacted state.

3. Loss of volatile material in the cut-back mixture at the immediate surface caused the formation of a thin hard surface crust but the mixture below the surface, retaining such volatile material, remained plastic and moved under traffic, thereby causing the surface crust to crack.

4. Extended manipulation did not remove sufficient volatile material from the cut-back sections to make them stable. The addition of filler material was much more effective than continued or extended manipulation.

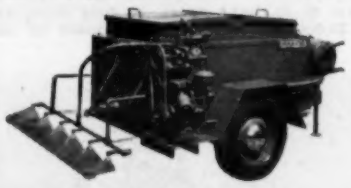
5. The lack of mechanical stability of the blow-sand was not compensated for by the cut-back asphalt while it retained the volatile diluent or by the slow-curing oil which had little cementing value.

6. The presence of the relatively small percentage of commercial limestone dust added as a filler to alternate sections could not be detected by visual inspection, on the basis of service behavior, or by analysis of the finished mixture. The filler naturally contained in the blow-sand varied considerably

(*Concluded on page 52*)

MARVEL

"JIFFY" SPRAY BAR



FITS ANY MAKE OF TAR KETTLE EQUIPPED WITH A POWER SPRAY. THE "JIFFY" WILL CONVERT YOUR KETTLE INTO AN OILER OR PRESSURE DISTRIBUTOR AND TRIPLE ITS USES.

ALSO

MARVEL VIBRATORS

Marvel Equipment Manufacturers, Inc.
224 So. Michigan Ave. Chicago, Ill.

Snake Holes!

WHETHER you call them, in your part of the country, "snake holes", or "toe holes", or simply "flat holes"— it's all the same to a Cleveland DR30 wagon drill. These low, slightly angling holes are just one kind that the Cleveland handles extremely well. It drills in any position, at any angle — straight down, flat, breast high, or higher than your head, or within four inches of the ground level — even straight up, when such a hole is needed. You will like the way it cleans the hole, and the drill runner will be enthusiastic with its ease of moving from one position to another. The DR30 has a feed capacity of more than eight feet. It handles depths to twenty-five feet, and more. You will want to see the recoil device, the handy centralizer, the double-screw, geared-together mechanism for raising the U-bar. Demonstration will be arranged to suit your convenience. May we send new Bulletin 132?

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CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby St., Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

★ Due to the necessity for conserving rubber, we can supply pneumatic tires only on special order for Government projects. You will find the broad-rimmed steel wheels a satisfactory substitute. There is a suitable price adjustment on account of omitting the rubber tires.

★ ★

THE CLEVELAND ROCK DRILL CO. CLEVELAND, OHIO

The new No. 90 Adams scraper.

A New 10-Cubic Yard Dirt-Moving Scraper

A new and improved dirt-moving scraper for use with International TD-18 TracTracTors and other tractors of similar size has recently been announced by the J. D. Adams Co., Indianapolis, Ind. This scraper, known as the No. 90, has a heaped capacity of 10 cubic yards.

The drop-center bowl provides quick penetration and balanced loading, it is stated, while four large low-pressure tires, over which the weight is evenly distributed, provide for easy hauling and plenty of flotation in soft materials. A 70-degree dumping angle is designed to insure free discharge of material, which can be spread evenly to any desired depth.

The frame is of all-welded box-type construction with full-oscillating front axle and tongue. All cables are in line down the center of the bowl and operation is easy and positive in action, the manufacturer states. The No. 90 is operated through an Adams No. 20 power control unit or any standard 2-drum hoist connected to the power take-off of the tractor.

Complete information and specifications on the Adams No. 90 scraper are contained in Form 4120, copies of which may be secured by those interested direct from the manufacturer.

Road Work Exempted From WPB Order L-41

On May 8 the War Production Board issued an amendment to Conservation Order L-41 which, with the exception of specific instances, exempts highway projects and establishes new procedures. Under the terms of the original order, authorization to begin construction was required on all highway projects and applications for such authorization were to be filed through a field office of the FHA. Under Amendment L-41-600, most highway construction can proceed without specific authorization and, where such is necessary, applications are to be handled through the state highway departments and the Public Roads Administration.

The amendment provides that generally, with the exception of projects using steel in any shape or form, work can be commenced without making application for authority to begin construction. Projects using steel are exempt if the highway agency or contractor had on hand or had ordered prior to the date of the amendment, May 8, the necessary steel which was obtained or ordered for the specific project or projects in question. Application for authority to begin construction is required in cases where the necessary steel was not on hand or ordered prior to May 8.

Although specific authorization to begin construction on highway work is now no longer required under Conservation Order L-41, the amendment provides that by the tenth of each month work reports on material requirements must be prepared and filed by or through the state highway departments to the Public Roads Administration, which in turn will submit monthly summaries to the War Production Board, thus furnishing the WPB with a check on the use of material and equipment for highway work.

Although the supply of bituminous materials and cement are adequate in some regions, transportation facilities are becoming critical, and for that reason these materials should be conserved wherever possible. In the Atlantic seaboard area, Recommendation No. 45 of the Petroleum Coordinator for War, dated April 24, 1942, prescribes restriction on asphalt and tar and their products for use on roads. These restrictions are independent of the operation of Conservation Order L-41 and its Amendment No. L-41-600.

In a letter to Thomas H. MacDonald, Public Roads Administration Commissioner, J. S. Knowlson, Director of Industry Operations, War Production Board, said: "Road and highway departments of Federal, state, county and municipal government agencies, as well as the private contractors, have made apparent, by the cooperative spirit in which they accepted this order [Conservation Order L-41] and the patience with which they have awaited a method of operating under its provisions, that they have understood fully the contributions which they can make toward winning the war by furthering the objectives of this Order."

Screw Spreader Bulletin

A new bulletin describing the latest model 10 to 14-foot and 20 to 25-foot Jaeger screw spreaders for airport concrete paving and military roads has just been released by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. Vacuum control for reversing the direction of the spreading screw rotation by the movement of a valve is featured on half-width models. The full-width models, now in demand for military bases and airport slabs, are equipped with independently controlled right and left-hand screw sections, eliminating the need for frequent reversal when spreading.

The manufacturer reports that contractors are showing production as high as 135 cubic yards an hour in placing 25-foot slab and 122 cubic yards an hour on 12-foot slab with mixes of as low as ½-inch slump. The full-width spreader is adaptable to both spreading and finishing bituminous materials as well. On 40-foot resurfacing pavement laid in half sections with two courses in Cook County, Ill., the Barberton Construction Co. handled 150 tons an hour on both base and top course of 1½-inch thickness. The top was a modified sheet asphalt.

A copy of the new Jaeger Bulletin No. CS-42, containing illustrated specifications, and Bulletin No. CST-43, containing the reports of numerous contractors on the use of this equipment may be secured direct from the manufacturer by mentioning this review.

C.H.&E.
Saw Rigs
Pumps
Rollers
C. H. & E. MANUFACTURING CO.
1810 No. Palmer St. Milwaukee, Wis.

"Whiteman"

Step No. 1

The Whiteman Rodding Machine—operated by one man, keeps up with any method of concrete delivery, simultaneously levels and condenses the pour with its power operated screeds.

Step No. 2

Floating the slab is a quick, simple job for one man with the Whiteman Finisher equipped with "Heavi-Duti" Trowels

Step No. 3

Finishing is fast, surfaces are harder when you use a Whiteman Finisher—with CRUCIBLE STEEL Finishing Trowels.

MACHINES
Finish Better
Concrete—FASTER!

The Whiteman 3-Step Method—

Here's the way to lay your concrete faster—indoors or outside. Put Whiteman Machines on your job—multiply the capacity of your men—get better concrete surfaces in less time, at lower cost!

Only two types of Whiteman Machines are needed!

Each step of concrete slab work is speeded by Whiteman Machines.

1. SCREEDING—One operator with the Whiteman Rodding Machine can simultaneously level and condense 4 cu. yd. of low slump concrete in 5 minutes. The power operated screeds, pulled forward by the operator produce denser concrete faster than any hand screed crew.

2. FLOATING—Put the Whiteman Precision Finishing Machine with "Heavi-Duti" FLOAT TROWELS on the job. Here, again, one man gets better results, FASTER! With the weighted, power-rotated, flat trowels, one operator compacts the mix, easily covers 1,000 sq. ft. in 15 minutes.

3. FINISHING—When ready to finish the slab, change trowels on the Whiteman Finisher and use the CRUCIBLE STEEL "FINISHING" TROWELS. Again the motor operated (gasoline or electric powered) machine does better work in less time. Your crews can do MORE than TWICE AS MUCH WORK as by hand. If you have a concrete laying job to do in a hurry—call on Whiteman—probably we can help you as we have scores of others.

"Whiteman"
MANUFACTURING COMPANY
Dept. C. 3249 Casitas Avenue
LOS ANGELES, CALIFORNIA

One of the five Smith tilting mixers for Fontana Dam in North Carolina.

Big Tilters for TVA

The 2,650,000 cubic yards of concrete which will be required for the new Fontana Dam, to be built on the Little Tennessee River in North Carolina by TVA, will be mixed by five 4-yard Smith tilting units. The contract for these mixers was recently awarded to the T. L. Smith Co., Milwaukee, Wis. The five mixers, operating in sequence, are expected to pour about 180,000 yards monthly, although the schedule may reach as high as 200,000 yards.

These tilters are of the front-end-charging type, fed by one set of batchers and discharging concrete into a central hopper. They have a 60-degree drum tilt with an automatic pneumatic tilting unit and are to be driven by direct-connected 75-hp electric motors.

Longer Air Hose Life

In hose used for compressed-air lines, damage from oil is sometimes considered almost a necessary evil. Although oil-resistant compounds have increased the life of air hose many times in the last few years, care in protecting the hose from overheated oil can still add to its service life and is of greatest importance today. Special helps which B. F. Goodrich Co. suggests that users of air hose of all kinds keep in mind are:

1. Keep your compressors in good repair, particularly the after-coolers.
2. Keep the hose cover clean. Wipe off any oil as soon as possible with clean waste or a cloth. Wash off mud or concrete with water.
3. Do not use pipe nipples or ordinary shank couplings which are held in place with standard bands or clamps. High-pressure couplings with clamps which fasten to the shank are safer. The quick detachable type is most convenient and satisfactory for use in portable-compressor and light-pneumatic-tool service.
4. Turn the hose end for end at intervals to alternate the positions of greatest exposure to oil, and also of greatest flexing.
5. Avoid kinks—and when they do occur, untwist with care.
6. Wash out the hose with clean water and drain it thoroughly if the hose is to be stored.
7. When an air tool is not in use for any length of time and the job is still working, turn off the air at the compressor to stop the flow of air and open the tool nozzle or outlet valve to release the pressure on the hose carcass. Trapped air under pressure weakens fabric or braid and shortens the life of the hose.

Lubricating Heavy Units

The lubrication of contractors' equipment is of the greatest importance. Today's machinery, as used in the construction field, has reached a high degree of perfection, but to maintain it at high efficiency, careful lubrication with quality lubricants is necessary.

The Lubriplate Division, Fiske Brothers Refining Co., 129 Lockwood St., Newark, N.J., in *The Lubriplate Film*, No. 5-41, discusses the lubrication of heavy-duty construction equipment under severe service conditions. Copies of this bulletin are available free on request to those referring to this text.

Selecting Cement Service

A helpful 32-page book has been compiled by North American Cement Corp., 285 Madison Ave., New York City, under the title "The Selective Use of Portland Cement," to assist contractors and other cement users in selecting the type of cement suitable to the various needs of concrete work. It deals particularly with the economies effected by the use of high-early-strength portland cement.

The book is filled with helpful tables and data on the proper selection of cement for various types of exposure of concrete, the choice of the proper water-cement ratio and the economies of high-early-strength cement. Copies of this booklet will be supplied by the cement company free on request to those mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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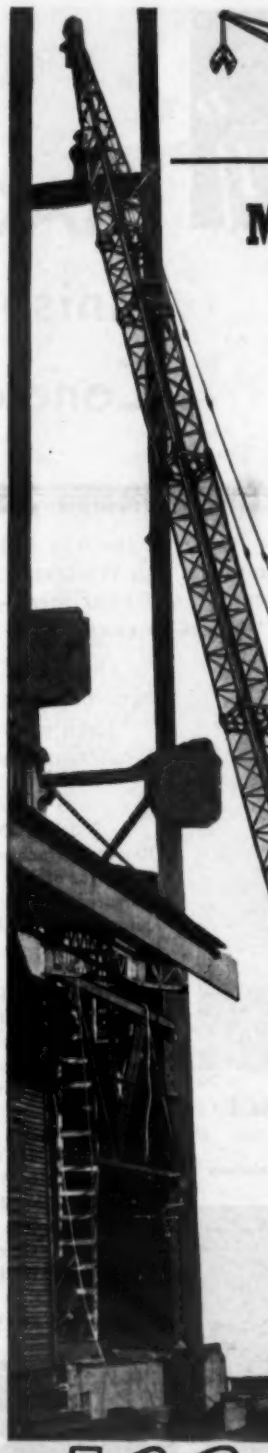
ALL MICHIGAN SHOVELS-CRANES are quickly convertible to any standard front-end attachment



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Owners are setting records on new construction, on maintenance work, in industrial plants and on scattered operations with the MICHIGAN Mobile SHOVEL-CRANE. Fingertip Air-Controlled clutches enable operators to maintain fast pace production without let downs due to operator fatigue. Maximum stability is provided by the low gravity center and low unit ground pressures of Model TMCT-16 (½ yd. Dual Tandem Drive). This complete MICHIGAN unit, mounted on its own specially designed MICHIGAN chassis, is fully described in Bulletin C62. Write for your copy.

The smaller MICHIGAN Model T6-D (⅜ yd. Single Axle Drive) is noted for its great productive capacity over a wide range of operations. This single-engined truck-type excavator-crane has its own specially designed and constructed chassis. Like the larger TMCT-16, Model T6-D's great stability is an outstanding feature, as are the Fingertip Air-Controlled clutches. Model T6-D is praised by owners for its low maintenance costs, flexible operation and high output. Bulletin C62-1 tells why. Your request brings full data by return mail.

SPECIFICATIONS Models TMCT-16 and T6-D

Model	Capacity	Weights		Tail Swing	Gross Allowable weight
		Shovel	Crane		Rating
TMCT-16	½ yd.	28000 lbs.	28000 lbs. to 28000 lbs.	7'-9"	35000 lbs.
T6-D	⅜ yd.	20500 lbs.	19000 lbs.	5'-8"	26300 lbs.

Bulletin C62-2 contains detailed specifications on Model TLCT-16 (Dual Tandem Drive) designed especially for high-speed cranework. Model TF6 (¾ yd. Four-Wheel Drive) and Model C-16 (½ yd. crawler) are completely described in Bulletins C62-3 and C62-4, respectively.

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Mechanical tampers were used to compact the earth around the piers for the Tigard grade separation near Portland, Oregon.

Scrapers Handle Fill at Structure

Roy L. Houck Used Scraper Fleet on Grade-Separation Approaches at New Structure At Tigard, Oregon

By HENRY W. YOUNG

✦ TYPICAL of many grade separation projects necessary to the safety and economical operation of modern highway systems is the one at Tigard, Ore., a suburb of Portland. This structure has become a part of the Pacific Highway No. 99-W and is the present termination of the four-lane road westward from Portland.

The work at this point was actually a combination of grade separation and grading jobs, designated as FAGH Grade Separation 73(5) and F-A 73(5), respectively. The contractor for the two reinforced-concrete structures was Jacobs & Jensen under a separate contract with the Bridge Department of the Oregon State Highway Commission. One of these is a bridge, 120 feet long, over Fanno Creek and the other a 343-foot structure which crosses over the lines of the Oregon Electric Railway Co. and the Southern Pacific, each with a single track and a passing siding under the structure, as well as over two country roads.

Of immediate interest was the grading necessary for the approaches to this structure, the contract for which, with the paving, was awarded to Roy L. Houck of Salem, Ore., at a total contract price of $178,724.50, and covered approximately 9,000 feet, principally to the east and with a short fill of borrow material to the west and between structures.

Houck's contract called for approximately 210,000 cubic yards of earth moving, 90,000 cubic yards of which was borrow from a side borrow pit, with approximately a 1-mile maximum haul. A small portion of the material used was old pavement and other excavated material secured in cleaning up some of the previous highway supplanted by the new four-lane road. This was excavated by a small Bucyrus-Erie 20-B shovel loading to trucks which dumped it in a stockpile on the approach fill. The remainder of the material from the borrow pit and the major cuts on the highway were handled by Carryalls and Tournapulls, in the operation of which type of equipment Houck is something of a past master and favors whenever possible.

Grading

Grading was proceeding nicely and Houck had nearly completed the fill, with only about 12,000 yards to go at the east end of the structure, when wet weather intervened. It was then necessary to suspend operations until the middle of June, 1941, when that part of the operation was cleaned up.

The bulk of the fill was done with five LeTourneau 12-yard Carryalls working with Caterpillar D8's, supplemented in the early stages by two LeTourneau 32-yard Tournapulls. The fill at the east end of the structure was completed by three Carryalls and a D8 tractor with bulldozer. Working on a 30 per cent grade, the bulldozer pushed the material into the toe of the fill in front of the piers as rapidly as possible, backing up the hill at each pass. At the same time the Carryalls brought in material, consisting of earth, pieces of pavement from the old road, and boulders up to 3 feet in size, from the rear of the stockpile, swinging in a loop back of the piers and depositing their loads around the cone of the fill under the structure as the fill was raised.

The constant movement of this heavy equipment over the fill and in and around the piers of the structure served to compact it thoroughly. Directly around each pier and extending for a distance of several feet, the fill was compacted by two Chicago-Pneumatic tampers.

The Borrow Pit

The borrow pit from which the 90,000 yards of fill material was taken was a quarry of laminated basalt with boulders running to head size. Base gravel had been secured from this pit the previous year under a subcontract let by Houck. A scalping screen was installed and 16,000 yards of grade material separated and stockpiled adjacent to the fill. All other paving aggregate was stocked ready for the start of concrete-paving operations later in the season.

Personnel

The contractor for this work was Roy L. Houck of Salem, Ore., for whom Mark Herbert was Grading Superintendent. H. C. Broadwell was Resident Engineer for the Oregon State Highway Commission, for which the work was done.

Under-Carriage for Cranes

Bulletin CU-142, recently issued by Six Wheels, Inc., 1572-84 East 20th St., Los Angeles, Calif., is devoted to its Maxi one-man crane under-carriage. Available in capacities of from 5 to 40 tons and speeds up to 17.5 mph, it is simple in construction, easy to manipulate, and engineered to conform to the design of the crane to which it is adapted. The value of a crane is measured by its productive use, and in many cases, according to the manufacturer, the Maxi crane carriage has increased production from 4 to 5 times, with but a very nominal increase of the initial investment.

Copies of this illustrated bulletin containing complete information may be obtained direct from the manufacturer by mentioning this item.

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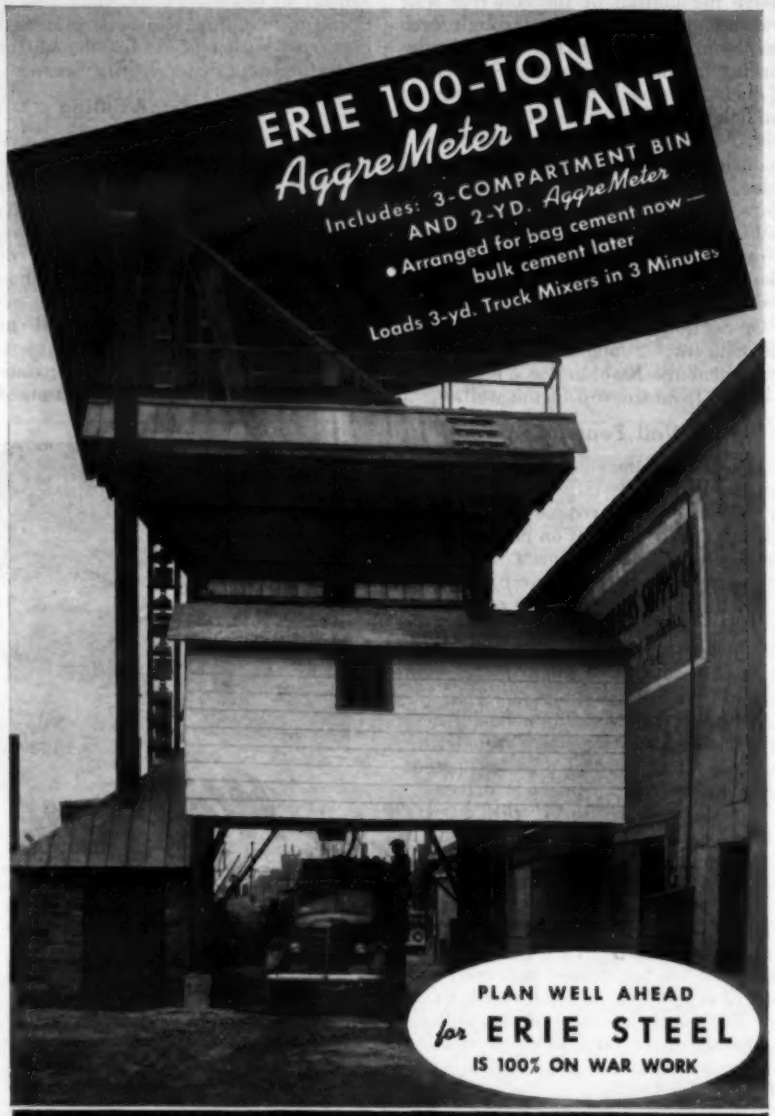
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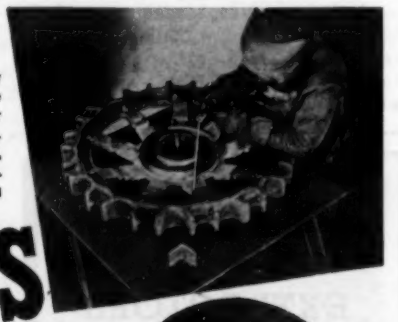

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Concreting Methods For High Flood Wall

(*Continued from page 23*)

channel was placed with its top 9 inches above the bottom of the concrete wall and was bolted together through each web by a ⅞-inch bolt. The vertical reinforcing of the wall is either ⅝-inch or ¾-inch deformed bars, depending on the height of the top panel. If under 4 feet, ⅝-inch bars were used; if over, ¾-inch bars were used. Similar bars were used for the horizontal facing above the elevation of the sheet piles within the wall, and ¾-inch deformed bars below the tops of the sheet piles. The vertical reinforcing was hooked under the bolted channel.

On Section 2, the wall faces are vertical with two 2-inch offsets 15 inches apart near the base, and a 1-inch offset 6 inches from the top of the wall.

Wall Foundation

Inasmuch as the stability of the cantilever wall depends largely on the solidity of the earth surrounding the sheet piles, all earth backfill on either side of the sheet piles was compacted in 3-inch layers with pneumatic tampers. The contractor used two Thor tampers with an Ingersoll-Rand portable compressor, mounted on a Ford truck, immediately adjacent to the piles where the sheepsfoot rollers could not operate. In the worst cases, undesirable material was removed and the trench backfilled with good material, compacted by sheepsfoot roller and then the piling was driven.

The Bethlehem sheet piling was driven a maximum penetration of 22 feet while the average was between 10 and 14 feet. The driving was done with a No. 7 McKiernan-Terry hammer in swinging leads handled by a Bucyrus-Erie steam crane. To insure proper alignment of the piles the contractor used 12 x 12 wales as guides. Material for the small amount of backfilling around the sheet piles was placed by a Lorain 40 truck crane and a ½-yard clamshell bucket.

Wall Forms

The forms on Section 1 were made of 5-ply wood with 2 x 10 studs, or strongbacks, and three 2 x 6 wales. A 3 x 6 was cut at the top on the proper angle for the offset and then flat for a butt joint with the plywood, and then notched at the front again to make a recessed butt joint with the upper plywood panel. These forms were built in 6 and 8-foot panels with a special 1½-foot separate form for the fluted pilaster. The forms were braced for alignment to 2 x 4's driven into the ground and tied with ⅜-inch rods left in the wall after the Universal form clamps were unscrewed and removed.

The specifications called for stripping the forms in 48 hours, but at the discretion of the Engineer Office they could be stripped in 24 hours in summer. The Lorain 40 was used throughout this section for handling forms, swinging the concrete bucket and for backfilling, operating as a general utility crane.

Concreting and Curing

The mixed concrete from the contractor's own concreting plant described below was delivered in two 1-yard Insley bottom-dump buckets carried on a flat-bed Ford truck. The buckets were handled by the Lorain 40 and discharged into the hopper of an elephant-trunk chute, and the concrete was vibrated continuously with Mall mechanically driven vibrators.

The specifications required a continuous cure for 14 days, starting immediately after the forms were stripped. This meant that all faces of the concrete had to be wet 24 hours a day. The contractor handled this by means of Soil Soaker cloth tubes such as are attached to garden hoses for watering lawns. Where the amount of water flowing through the pores of the cloth was not quite sufficient, pinholes were pricked in the tube with pins or nails to increase the flow. Further, to insure an absolutely uniform flow of water down the face of the concrete and thus prevent streaking, burlap was carefully laid over the tube with the edge of the burlap even with the top edge of the wall. This was particularly important in hot weather where a very thin film of water could be dried up before it would reach the bottom of the wall, and thus result in streaking.

Conduit Design

Park Creek, a sizable flashy stream flowing through the heart of Binghamton into the Susquehanna River, has been put underground in a large conduit to overcome the necessity of extensive riprap and fencing. The conduit was constructed on a new alignment, instead of in the old creek bed, which required the excavation of a trench for approximately its entire length. The Link-Belt Speed-o-Matic dragline worked from ground elevation, casting the excavated material into the area between the old stream bed and the new conduit location.

The conduit is arched 17 feet in diameter with a 13-foot vertical rise from the invert and measures 21 feet out-to-out of the invert. The invert is built on a 17-foot radius. A wall 2 feet 7 inches high and 21 inches wide at the bottom and 15 inches wide at the top was poured at the same time as the arch was poured. The arch is uniformly 15 inches thick wall to wall.

The invert was poured first in 20-foot sections, requiring 27.77 cubic yards per section, and the arch 34.43 cubic yards per 20-foot section. The arch is heavily reinforced longitudinally to tie the sections.

(*Concluded on next page*)

WAR-TIME HELP FOR FLEET OPERATORS

• TODAY as never before, fleet operators are interested in preventive maintenance. More service and longer life from each unit is the order of the day in a nation which means business in winning the war.

No group is better qualified by education and experience to help operators gain these ends than is the Standard Automotive Engineering staff. These men have tackled every phase of the problem, from cost accounting to shop practice. Here's an example of how their advice helped solve one problem in fleet conservation.

Sludge formation in the equipment of the Kalamazoo Creamery pictured above was troublesome. Engines required frequent cleaning. This meant needed equipment taken out of service—high part replacements. Here's a quick view of what an Engineer found and did:

- Engines idling large part of time.
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- Demonstrated how adjustments could be accurately maintained with instruments.
- Advised chief mechanic in use of instruments (purchased by fleet).
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- RESULTS—Sludging eliminated. Big savings in parts, labor, and oil. Gasoline mileage increased up to 20% per unit.

STANDARD OIL'S
FLEET CONSERVATION SERVICE

Sludging may not be your trouble, but the same basic problem confronts you—more service and longer life. There are seven ways listed below in which Standard's Fleet Conservation Service may help you. Just write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois. Ask to have an Automotive Engineer explain this service fully. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

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Standard Automotive Engineers can help you...

1. Locate high maintenance items by suggesting practical cost accounting records.

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3. Lengthen valve and ignition system life by scientifically determining engine adjustments.

4. Reduce road failures by suggesting proved preventive maintenance methods.

5. Increase wheel bearing and transmission life by recommending lubricants and maintenance schedules.

6. Stretch tire mileage by analyzing and correcting causes of excessive tire wear.

7. Get more power . . . use less fuel by recommending adjustments to take full advantage of available fuels.

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Special Equipment
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Distributors in Principal Cities

Flood-Control Project In Western New York

(Continued from preceding page)

Conduit Forms

The first operation after the completion of the invert was laying a track with a 5-foot gage exactly to grade on the invert, using either steel rails or hard wood for rails. On these rails the four-wheel carrier for the inner 20-foot steel forms was run from section to section, as alternate sections were poured. The carrier had ten hand jacks, some with ratchet wrenches and others operated direct from a cross bar, all acting as direct screws. As these would not set the forms completely, a large number of wooden wedges were used to adjust the forms to final line and grade. One steel form had wooden extensions bolted to the ends for pouring the alternate 20-foot sections between those already poured.

The outside forms were wood, made in three sections for each side, and were also made 20 feet in length. They consisted of 2 x 8's cut to the proper curve and carrying ½-inch plywood as originally made, but as the plywood wore out it was replaced with 1 x 3-inch tongue-and-groove lumber. Double 2 x 6 wales were bolted across the center of each section longitudinally and at one side, using a single 2 x 6 laid flat on the other side of the center. These sections were bolted together through 2 x 6's nailed to the templates.

Concrete Plant

The plant for the 1941 concreting was located adjacent to the Park Creek conduit. The spoil from the conduit excavation having been placed on the side opposite the concrete plant, the area between the conduit and the plant was left clear for the operation of the crane when it was placing concrete and for the truck hauling the concrete buckets. The contractor's machine shop and storage yard was also located in the same area.

Aggregates for the entire operation were stockpiled adjacent to the plant. In order to protect the sand which was brought from Boonville, N. Y., about 200 miles by freight, because of the failure of local sand to meet soundness requirements, a layer of gravel was first spread on the ground covered by local sand and then the imported sand placed on top of this. Both gravel and sand were handled from the stockpiles by a P & H crane with a ¾-yard Kiesler light-weight rehandling clamshell bucket, and placed in the 40-cubic yard divided bin of the Butler batching plant. A wooden chute with a control gate, making it possible to hold one batch in the chute, was arranged immediately beneath the discharge from weighing batchers and was used to deliver the batches to the skip of a Rex 27-E paver with a shortened boom. A depressed roadway immediately in front of the paver made it possible for the flat-bed truck to back under the paver bucket which discharged directly into the 1-yard Insley bottom-dump buckets. When working on the conduit, the truck operated with one full and one empty bucket, but on the longer haul to the flood wall, the truck always carried two full buckets.

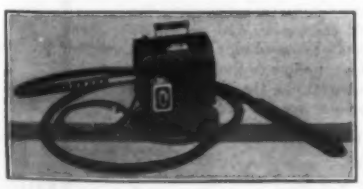
U. S. E. D. Photo

Curing a panel of the new flood wall at Binghamton, N. Y. Burlap on the top of the wall gives uniform wetting and prevents streaks on the face.

The cement shed was built on the opposite side of the paver from the batching plant with the floor mounted on empty oil drums. It was built with a wooden roof covered with tar paper and the sides protected with tarpaulin. It had a capacity of 1,000 bags which were hauled out to the skip by two men using hand trucks, with the six bags for one batch on a truck.

Personnel

Section 1 of the Binghamton, N. Y., Flood Protection Project was awarded to Pepper Bros. Contractors, Inc., and C. D. Murray Co., Inc. of Syracuse, N. Y., on their combined bid of $222,964.80. The work was done under the direction of the Binghamton District Office, U. S. Engineer Department, Lt.-Col. J. C. Marshall, District Engineer, with D. E. Mather as Resident Engineer for the U. S. E. D. and Carl Menken, Superintendent for the contractor.



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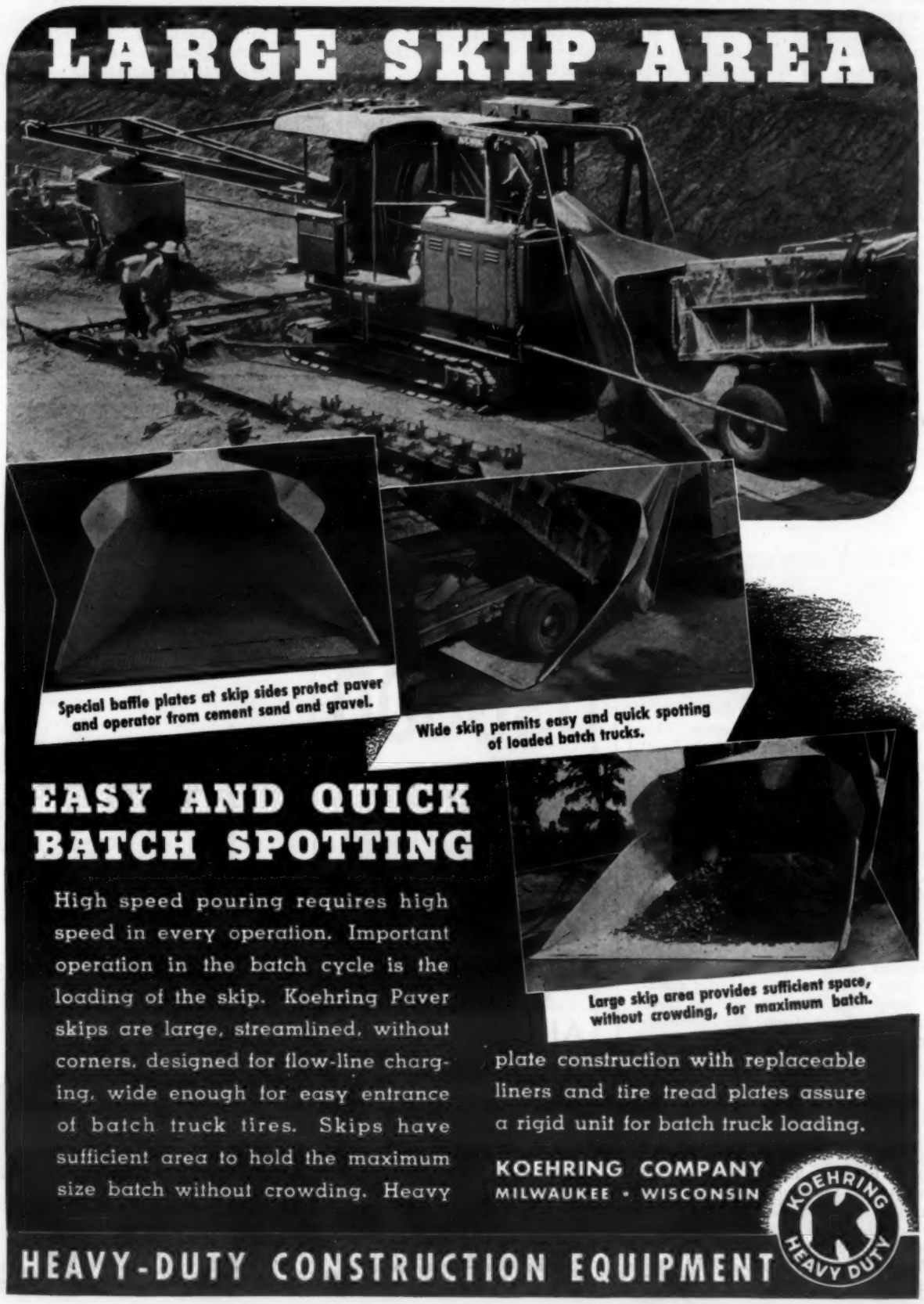
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Wide skip permits easy and quick spotting of loaded batch trucks.
Large skip area provides sufficient space, without crowding, for maximum batch.

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High speed pouring requires high speed in every operation. Important operation in the batch cycle is the loading of the skip. Koehring Paver skips are large, streamlined, without corners, designed for flow-line charging, wide enough for easy entrance of batch truck tires. Skips have sufficient area to hold the maximum size batch without crowding. Heavy plate construction with replaceable liners and tire tread plates assure a rigid unit for batch truck loading.

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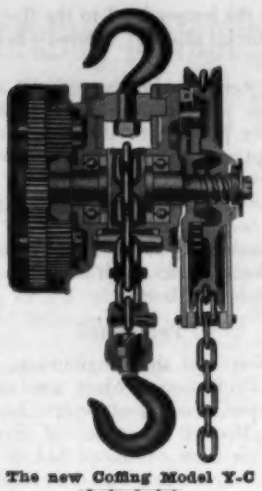

The new Coffing Model Y-C chain hoist.

A New Chain Hoist

An improved standard-type spur-geared chain hoist has just been announced by Coffing Hoist Co., Danville, Ill. The manufacturer reports that for many months its business has been such that very little time could be devoted to the development of new products but this new hoist has recently been placed in production. It is recommended for applications in practically all lines of industry and maintenance-garage operations where speed, safety and durability are essential.

The Model Y-C is equipped with a guard to protect the Weston-type brake from dust and dirt. Heavy suspension plates provide support between the top hook crosshead and the load sheave. These plates also directly support the saddle for double-chain hook-up which is an entirely new feature in this type of hoist and eliminates the use of a top yoke. This reduces the weight and headroom, permitting the hoist to hang evenly at all times.

This hoist is built in ½, 1, 1½, 2, 3 and 4-ton capacities. Each hoist is tested at 100 per cent over its rated capacity and guaranteed against defective material and workmanship. A new 4-page folder describing this hoist in detail will be sent free on request to those mentioning this text.

New Vibrator Head

An improved vibrator head has recently been announced by Marvel Equipment Manufacturers, 224 So. Michigan Ave., Chicago, Ill., for its line of concrete vibrators. In addition to the customary ball bearings at each end of the rotor, a ¾-inch steel ball is now inserted between the nose of the vibrator head and the rotor. This extra thrust bearing carries the full weight of the rotor when the head is operating in a vertical position, and absorbs most of the internal wear, it is stated. In addition, there is a new effective system of splash lubrication designed to insure a constant flow of oil to the upper bearings. Not only do these improvements prolong the life of the head but actually produce a more powerful vibration, the manufacturer reports.

Further details on Marvel concrete vibrators and the new improved vibrator head may be secured by those interested direct from the manufacturer by referring to this item.

Know Your Ropes

This is the title of an instructive and very useful 82-page manual on the selection, application and care of wire rope in order to secure the maximum service life. At this time, with steel a critical war material needed badly for war production, the proper care of wire rope becomes a matter of vital importance.

By means of text, tables and illustrations, "Know Your Ropes," now in its fourth edition, covers practically every aspect of wire rope production, its selection for a specific job, and its maintenance and care. Since it was first published, more than 25,000 requests for it have been filled.

Copies of "Know Your Ropes" may be secured by interested contractors and engineers direct from the Wickwire Spencer Steel Co., 500 Fifth Ave., New York City, by referring to this item.

Start NOW to Check Your Snow Equipment

The United States as well as her Allies has learned the bitter lesson of the disastrous effects of unpreparedness and complacency. The lesson of Pearl Harbor can well be carried over into every phase of activity concerning the war effort. One such phase, the responsibility for which rests on state and county highway engineers, is that of keeping our highways open to traffic during the winter months.

In many sections of the country, the winter just past was unusually mild. But do not be lulled into a false security by that fact, for next winter may be just the opposite. And above all don't wait until snow flies before preparing to handle it.

The Davenport Locomotive Works, Division of Davenport-Besler Corp., 2320 Rockingham Road, Davenport, Iowa, points out that its entire organization is engrossed in war production. It can, however, supply repair parts for maintaining Davenport-Frink Sno-plows and other essential equipment, but the company asks particularly that you check up on your snow removal equipment as soon as possible, estimate what your needs for next winter will be, and give them ample time to supply those needs. Every cooperation will be extended to its customers, and the company asks similar cooperation on the part of those responsible for snow removal, so that there will be no blocked highways next winter because of delays.

Information on repair parts and on the availability of new equipment should be addressed to Davenport by those west of the Mississippi, and to Carl H. Frink, 1000 Islands, Clayton, N. Y., by those in the East.

New Dynamite Stick Tamps Tight in Hole

A new dynamite cartridge, which will expand under tamping to fill the bore hole and concentrate the charge, has been announced by the Explosives Department, Hercules Powder Co., Wilmington, Dela. The new cartridge, called Tamptite, eliminates the necessity of slitting cartridges and is designed to prevent spillage of powder.

Dynamite in the new cartridge is packed in a waxed-paper shell having a line of perforations spiraled around the dynamite stick. It contains the same weight of paper as a standard shell. The line of perforations is located between inner and outer layers of paper so that there is no direct track through which moisture might enter or ingredients leak out. The shell is not weakened to the point where priming is difficult and the cartridges stand up during shipping and handling on the job just as well as regular cartridges, according to Hercules.

When tamped in a bore hole, the cartridge does not open, as a slit cartridge does, but unwraps slightly as the cartridge expands to fill the hole. Splitting along the perforated line permits the dynamite to be telescoped to a shortened length while it expands to the diameter of the hole. Even in upper holes where dynamite in slit cartridges often spills, little or no spillage occurs with this new cartridge. All of the Hercules brands and grades commonly used in quarrying, contracting and underground work, in sizes up to 1¾ inches in diameter, are available in the new shell.

Choice of Aggregates For Asphalt Pavements

The question of aggregates and the selection of a dense or open asphaltic mix are very frequently being faced by highway engineers. In discussing this point in his paper on "The Maintenance of Road Surfaces with Asphaltic Mixtures," E. E. Scholer of the Shell Oil Co., Inc., St. Louis, Mo., points out that many of the problems of asphaltic paving can be solved by using a denser mix and at the same time softer asphalts.

The dense mix not only protects the pavement from so-called stripping but, by the same token, retards oxidation. The unsound aggregate is largely protected by the waterproofing qualities of asphalt. The abrasion of soft aggregates is minimized by the cushioning effect of asphalt, plus the elimination of self abrasion by one particle against the next. Aggregate lacking in toughness is, of course, greatly enhanced in value by the flexibility of asphaltic pavements. Mr. Scholer gives as a rule of thumb, "If you have any of these aggregate problems, avoid open mixes."

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—and there's a reason, for Owen Heavy Duty Excavating Buckets like modern war tanks, are designed and built for tough assignments and are always dependable under the most difficult operating conditions. Quality materials used in construction throughout, assure long service life with a minimum of wear.

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AIR CONTROL

The leader of them ALL for smooth, fast and efficient shovel, dragline, or crane operation. We have a brand new catalog awaiting your request.

THE OSGOOD CO.
MARION OHIO

YOU MEN WHO TRAVEL TO MILWAUKEE

HERE'S YOUR BEST LOCATION

In the very center of the business and entertainment districts, The Wisconsin offers 450 "hospitality units"—rooms of superior comfort, plus a genuinely friendly atmosphere. Coffee Shop and Cocktail Lounge. Garage and parking lot.

LEWIS S. THOMAS, MGR.

WITH BATH from $2.50 without bath $1.50

HOTEL WISCONSIN
Owner operated by the Milwaukee Hotel Wisconsin Co.

Above rates subject to 10% increase effective December 1, 1941, in Milwaukee hotels

Making Application For Road Materials In Eastern States

The procedure to be followed by governmental agencies in the seventeen Atlantic seaboard states in applying for bituminous materials for highways has been announced by the Public Roads Administration, official certifying agent for the Petroleum Coordinator for War.

An applicant for "a certificate of necessity of use of bituminous road material" must be the authorized representative of the governmental agency having jurisdiction over the highways or streets on which such use is to be made. The applications must be made on Form PRA-B-1, copies of which are available from the district or state offices of the PRA or the state highway departments.

The official applicant must supply all pertinent information required for a finding by the PRA that the highway or street described is necessary to the successful prosecution of the war, including the continuing accommodation of essential civilian traffic, and that the proposed use of the bituminous road material is essential in the kind and amount described. These two points are the basis of review and the approval or disapproval of applications by the officials authorized to perform this function.

All applications except those of Federal agencies should be submitted to the state highway department, which reviews and recommends approval or disapproval of each application and then forwards it to the District Engineer of the Public Roads Administration. The PRA District Engineer is authorized to give final approval to all applications relating to highway or street projects previously certified as important to national defense by the War or Navy Department or other appropriate national war agency, and to projects for which a Project Preference Rating Order P-19-e has been issued or which is covered by a Preference Rating Certificate PD-3A with respect to any critical material involved. His approval is contingent upon his finding that the use of bituminous material of the kind and in the amount applied for is essential. He must disapprove all applications relating to highways and streets determined generally by the PRA to be ineligible under the limitations of Recommendation No. 45 of the Petroleum Coordinator.

All applications will be returned to the applicant, with approval or disapproval indicated either by a District Engineer or the Washington Office of the Public Roads Administration. An approved application or a photostatic copy is to be accepted by suppliers of bituminous road material as evidence that such materials may be purchased in the kind and amount designated.

Rubber Hose Care

In the interest of rubber conservation, a useful wall card on the proper care of hose has been prepared by the Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J. This card, which is 8¾ x 11 inches in size and has an eyelet for convenient hanging on the wall, lists rules for the proper care of air, water, steam and other types of rubber hose, and for the proper attaching of couplings.

Copies of this helpful wall card may be secured by those interested direct from the company by mentioning this item.

Pugs for Asphalt Plants

Twin-shaft pug mixers built ruggedly to stand the gaff of hot-mix operations and with fast bottom-type discharge gates, adjustable to prevent leakage of aggregates or bitumens, are completely described in Bulletin No. 500-3 issued by Standard Steel Corp., 5001 So. Boyle Avenue, Los Angeles, Calif.

A pug mixer, designed especially for lean mixes, giving 1, 2, 2½ and 4-ton batches and built with a single shaft, is described in Bulletin No. 500-4. Either or both of these bulletins may be secured promptly by writing to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Geerpres MOP WRINGER

DOUBLE, STAGGERED GEARS CANNOT POSSIBLY SIDE SLIP

Gear Shaft Size Increased—Will Not Warp Under Excessive Strains

Patent Pending

reduces mop costs from 25 to 50 per cent over other methods of wringing—retains the mop fabric in a soft fluffy condition most desirable for rapid mopping. No more loose mop strings to catch around legs of desks and furniture when using GEERPRES.

New construction makes this wringer last for many years. Made in two sizes, small size will wring mops 14 to 24 ounces inclusive, large size 20 to 36 ounces. Available with or without tanks. Send for free circulars and prices.

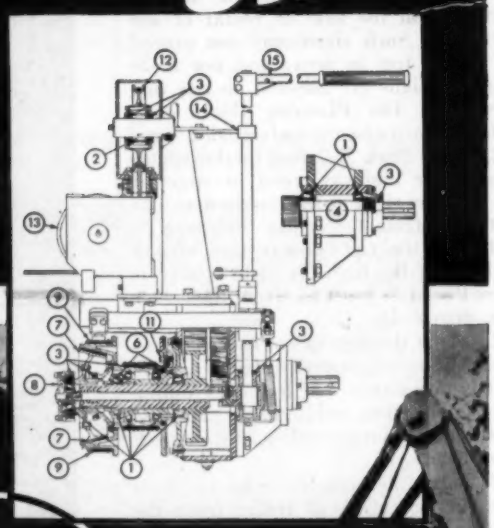
GEERPRES WRINGER, INC.

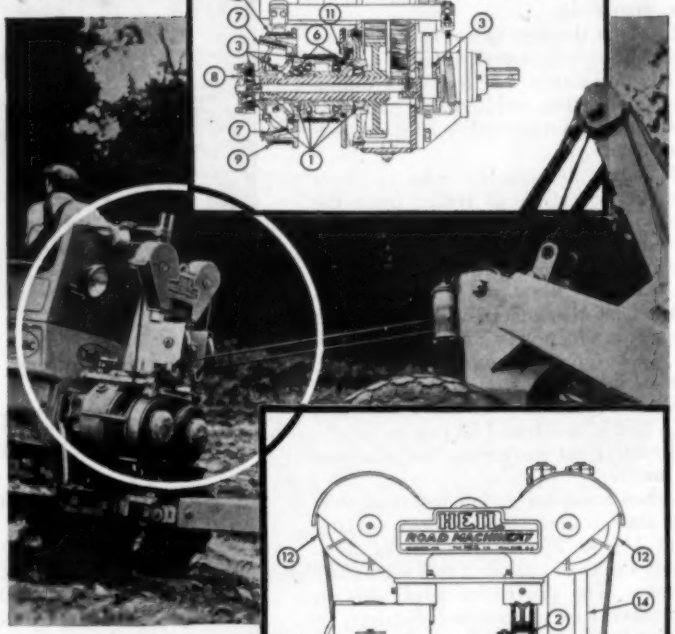
Manufacturers of High Grade Mopping Equipment

MUSKEGON, MICH.

HEIL POWER CONTROL UNIT

...gives you *instant* cable response for *fast, profitable* operation!



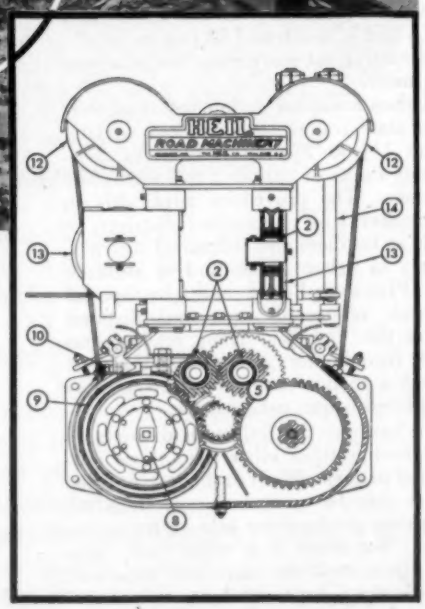


Power Takeoff Adapters Available for All Current Model Tractors

Heil Power Control Units are designed for use with all makes of tractors from 45 to 150 H.P. The double drum model, shown here, is an all purpose unit providing two-line cable control for operation of Twin-Cable Scoops, or for operating two single cable units such as a Bulldozer-Ripper combination.

Large diameter brake and clutch drums insure smooth, positive action, and ample air cooling surfaces provide rapid heat dissipation. Smooth operating brake and clutch assemblies eliminate shocks and damage to cable, tractors, and auxiliary equipment. Large diameters and smooth-surfaced grooves of the fair lead sheaves and upper reaving sheaves reduce cable wear to a minimum.

Check the outstanding construction and operating features of Heil Power Control Units shown in the cross-section illustrations at the right. Write for new Heil Bulletin No. Z2138.



CONSTRUCTION FEATURES

1. Timken Tapered Roller Bearings (Total of 12)
2. Hyatt Roller Bearings (Total of 8)
3. Oil Seals (17) eliminate oil leakage and dust infiltration.
4. Interchangeable Power Takeoff Adapters for Allis-Chalmers, Caterpillar, Cletrac, and International-Harvester tractors.
5. Heavy duty forged alloy steel gears.
6. End thrust carried on oversize Timken Tapered Bearings.
7. Heavy duty cone clutch.
8. Conveniently located clutch adjustment thrust nut assembly.
9. Heavy duty self-energizing brake.
10. Conveniently located brake adjustment set screw.
11. Cable anchoring clamp.
12. Level winding roving sheave running on Hyatt Bearings.
13. Fair lead sheaves, swing on 110° arc.
14. Operating control shafts firmly supported against vibration.
15. Short throw control levers adjustable vertically and radially.

Heil Power Control Unit insures fast, positive operation of Heil Hi-Speed Tractor Scoop.

THE HEIL CO.

General Offices: Milwaukee, Wisconsin

The Original BucketruX

Trade DEMPSTER DUMPSTER Mark

Reg. No. 353486

Mfgd. by

DEMPSTER BROTHERS, Inc.

Knoxville, Tenn.

Restriction of Signs Improves Roadsides

(*Continued from page 28*)

the county ordinance is considered a misdemeanor and punishable as such.

Districts and Requirements

The areas or districts in which signs may be erected are divided into residence districts, agricultural and unclassified districts, urban areas, and business and industrial districts. In residence districts, no sign other than that used in connection with the sale, leasing or rental of the premises, and not exceeding 8 square feet in area, is permitted. The exception to this is that where a subdivision or large tract of land is involved permission may be given for a temporary sign, not to exceed 32 square feet in area, for a period not to exceed six months, covering the sale of the premises.

In agricultural or unclassified areas, which are those outside of urban areas described below, no sign is allowed within 150 feet of the center line of any highway, road or street, except officially recognized directional or historical markers of approved size and design, or signs relating to farm produce grown or produced on the premises or in connection with the sale or rental of the premises. Such signs may not exceed 20 square feet in area; and not more than two signs are allowed on any one premises. The Planning Board may grant authority to erect advertising signs not nearer than 150 feet to the center line of the highway, road or street if the highway right-of-way is less than 125 feet wide from the center line, and 25 feet from the right-of-way line of any highway if the highway right-of-way is more than 125 feet wide from the center line, provided:

1. That the sign is not so located as to constitute a hazard to traffic at a curve and is not within 500 feet of a public road intersection, public park, parkway, reservation, playground, school, church or cemetery.

2. That the sign, in order to avoid diverting attention of traffic from the road, in the interest of safety, is not placed within 500 feet of another advertising sign placed on the same side of the road.

3. That the advertising sign is not in an area which may, after public hearing, be designated as of scenic beauty or historic interest.

4. That the sign is not more than 15½ feet in width and 52 feet in length, and carries not more than two advertising units.

Urban areas are designated along certain state routes for distances varying from 1½ to 2½ miles from the corporate limits of various cities within the County. The provisions applicable to agricultural or unclassified districts, as well as business and industrial districts, apply in urban areas; and in addition the Planning Board may, by special permit, reduce the required distance from the highway, from intersections and from other advertising signs at which a particular advertising sign may be placed within urban areas.

In business and industrial districts no advertising signs other than those permitted in agricultural or unclassified districts may be erected, except signs advertising products for sale on the premises. Not more than three such signs are permitted on any one structure. These signs must not have an area of more than 20 square feet each, provided, however, that if any one sign carries only the name of the business it may have an area of not more than 50 square feet. These signs must be securely attached to the main business structure, and must not project from the building over the right-of-way line. In special cases of industries well back from the road, the Planning Board may grant permission for placing on the particular structure a sign, or signs, larger in area than 50 square feet where these signs will not unduly divert attention of travel from the road.

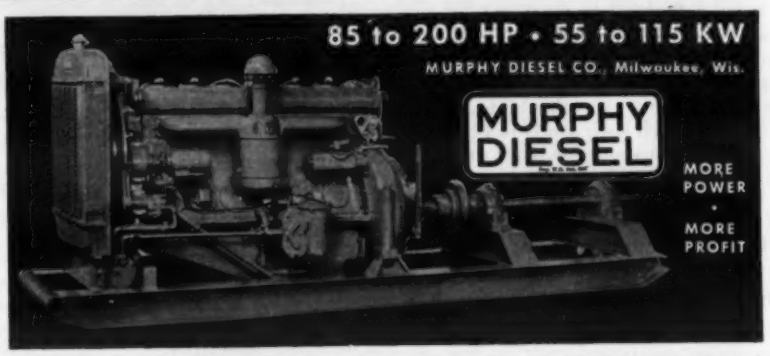
Copies of the amendments to the Glynn County zoning ordinance covering advertising signs, which completely supersede all earlier ordinances, can be secured from H. J. Friedman, Engineer-Director, Glynn County Court House, Brunswick, Georgia.

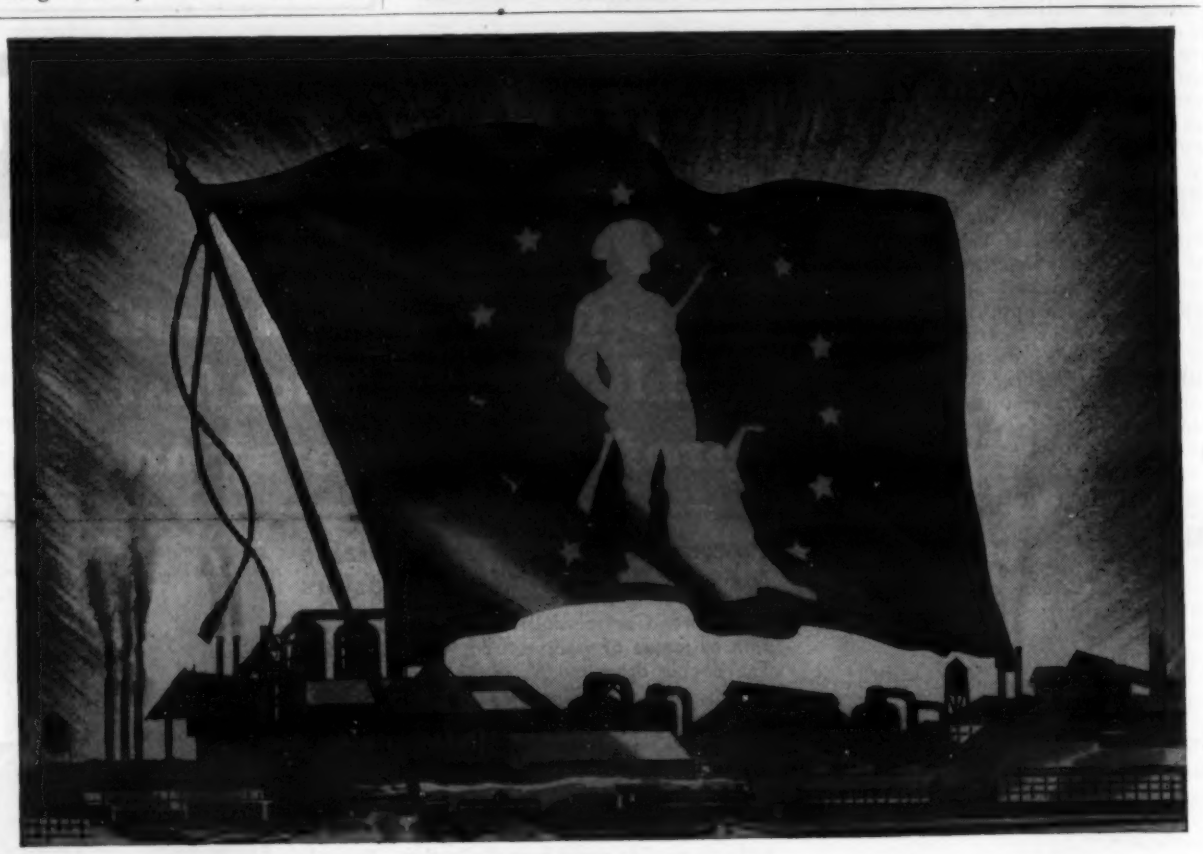
Data on Zinc Substitutes

In almost innumerable ways zinc is vital to the war-production program of this country. An increasing number of inquiries have been received by the Protective and Technical Coatings Section, Office of War Production Board, for information regarding suitable substitutes, for non-defense purposes, for the zinc coating formerly used on various iron and steel surfaces. A very complete study of substitute paint coatings has been prepared by E. F. Hickson, Chemist, National Bureau of Standards, and appeared in the January, 1942, issue of *Public Roads*.

The article reports substitutes for various uses of zinc-coated metals, giving descriptions of materials, references to available reports and specifications, and a final bibliography of the complete titles of all Federal Specifications referred to in the article. All of these specifications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

We heartily recommend a study of this article by all who are faced with the continued protection of metal surfaces for which the usual metallic zinc coatings can no longer be secured.





Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly*, every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, TIME IS SHORT.

Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

Make Every Pay Day "Bond Day"

U. S. WAR Bonds ★ Stamps

This Space is a Contribution to Victory by CONTRACTORS AND ENGINEERS MONTHLY

Flood Pump Station, Unusual Excavation

Old Railroad Fill Made With Various Materials Offers Problem on Job At Wellsville, Ohio

✦ THE new earth dike, a short section of concrete flood wall, and the storm water pumping station constructed by the U.S. Engineer Dept., Pittsburgh District, to protect Wellsville, Ohio, from floods on the Ohio River, are all built on or in a railroad fill. The right-of-way for the work was entirely on a narrow strip between the steep river bank and the freight tracks of the Pennsylvania Railroad from the west into Pittsburgh. In years past the railroad made its fill in the usual method of side-dumping available stable material from the outside track and then blading it with the standard railroad grader. This resulted, over a long period of years, in a series of variegated strata of granulated slag, hard crushed slag, flue dust from blast furnaces, cinders, and brick and other refuse from old blast furnaces. This fill has a depth of about 30 feet with layers of the various materials of different thicknesses but generally on a slope of 1 to 1.

It was in this material that Sanctis Construction, Inc., contractor for the Wellsville, Ohio, Flood Project, Part 2, had to excavate for the new pumping station to handle the water in a 78-inch storm sewer at the bottom of this fill, raising the water over the top of the new 8-foot high dike.

Pump Station

The excavation for the pumping station was carried the full depth of the railroad fill, the hole being 40 x 30 feet at the top and narrowed down to the finished bottom measuring 30 x 14 feet. The slag stood up well and about the only material that required any bracing was the flue dust where the strata were thickest and the dust started to flow. At these points and at selected possible danger points in the depth of the hole, 12 x 12 timber braces were placed across the short dimension. Twice during the excavation the hole was flooded out, once from the river and the other time from the sewer when the hole acted as a surge chamber on the line.

During high water in the river two 30-inch pumps in the pumping station will lift the storm water from the 78-inch sewer a height of 29 feet and discharge it into a V-shaped concrete box, the outlet from which is a 48-inch corrugated-metal pipe discharging into the flood waters of the Ohio River. Instead of the usual flap gate used on smaller pipes, the 78-inch storm sewer is shut off from the river by a large hand-operated gate when pumping is to be used to discharge the water into the river.

The contractor used mixed-in-transit concrete from a commercial plant in East Liverpool, Ohio, a haul of 7 miles, for concreting the base of the pump house. The concrete was placed with a Koehring crane and a 1-yard Blaw-Knox roller-gate bottom-dump bucket. Practically all of the excavation from the pump house went into the dike, but part of the material which was too coarse went into a waste area about 500 feet distant from the pump house. The visible portion of the pump house upon completion was built up of yellow brick, housing the pump motors well above high water.

The Dike

The dike in this project is about 1 mile long and was built chiefly with material from a borrow area about 2 miles distant in the hills. The earth was loaded with a Lorain 1¼-yard shovel to trucks which hauled the material to the site and end-dumped it as directed. The material was then spread in 8-inch loose layers by an Allis-Chalmers tractor equipped with a 9-foot bulldozer and thoroughly compacted into 6-inch dense layers with a sheepsfoot roller pulled by a Thirty tractor. The material is a clay with a small proportion of sandy shale. The dike as completed has an 8-foot top and 1 on 2½ slopes generally but these were reduced to 1 on 1½ where the area available for the construction of the dike was constricted by the proximity of the railroad tracks to the river bank.

Drainage Casting

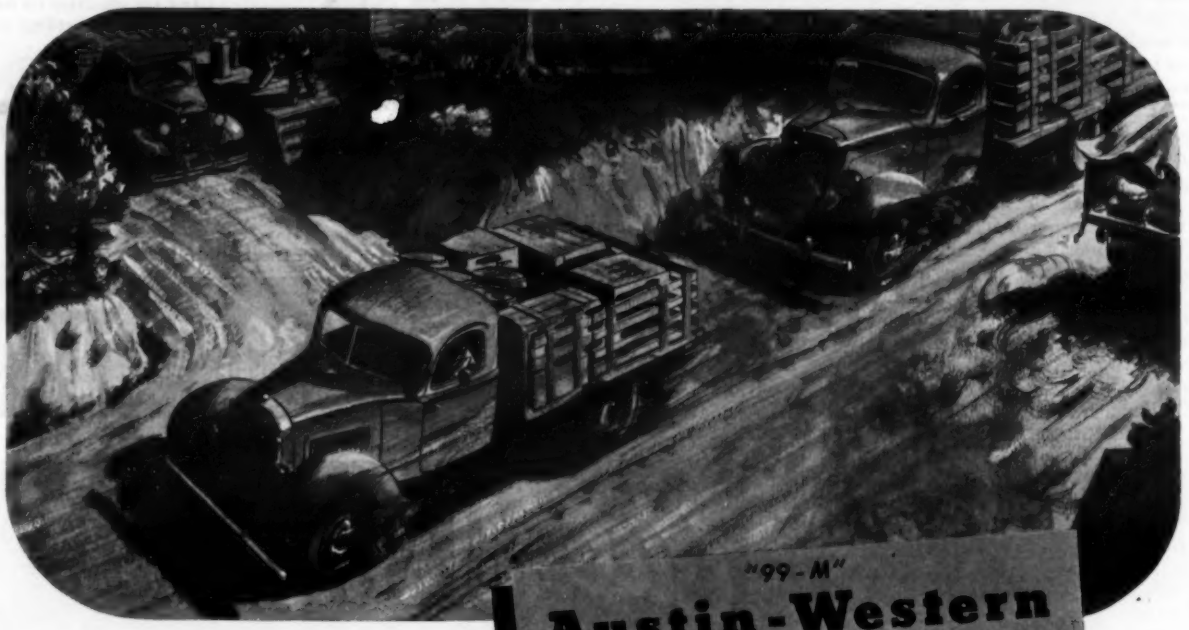
A minor but interesting feature in the care of surface drainage between the dike and the railroad tracks was the method of protecting the top grating of the drainage casting from theft. Several drop inlets were constructed with inverted baskets of cast steel over the top and a 15-inch square removable grating in the top. Since scrap iron is now among the "precious metals," the contractor feared that in this somewhat isolated area the top gratings would be stolen. At his own

(*Concluded on page 50*)

C. & E. M. Photo
A cast-iron drainage casting with the cover held in place by welded rings to prevent removal by enthusiastic scrap-iron collectors.

● America's unmatched system of strategic and secondary highways is playing an important part in the war effort. Road builders have every right to be proud of the part they have played in making possible the speedy movement of men and materials so essential to victory.

KEEP ROADS UP TO "KEEP 'EM ROLLING"



"99-M"
Austin-Western
POWER GRADER

Keep On Top of Your Maintenance Program With a "99" LOADER

Hooked up to your A-W "99" or "99M", this efficient Loader saves time and money (1) where high sod shoulders must be worked to prevent accumulation of surface water; (2) where excess dirt in ditches or on wide shoulders must be removed.

Write for Full Details

● Roads are playing an increasingly vital part in America's Victory Program . . . serving the armed forces by enabling farms and factories to deliver the goods that "keep 'em rolling." That's why it's so important that all available machinery be kept fit for full time maintenance work.

You who own A-W machines have the advantage of the extra durability that's built into them. But you can't be sure even this rugged equipment will outlast the emergency unless you have it serviced promptly and regularly.

Consult your nearest Austin-Western dealer for helpful, constructive advice on how best to conserve your road maintenance equipment. Let him help you "keep 'em rolling." THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four — clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

HAVCO

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Pier Construction For Cut River Bridge

(*Continued from page* 11)

at depths between 12 and 20 feet and refusal was obtained at approximately 25 feet. It was possible to obtain only 2 or 3 feet additional penetration by the use of jets and it was not considered safe to jet on account of the possibility of causing extensive landslides, since the walls of this gorge are on an approximately 1½ to 1 slope. The abutments are located immediately at the top and the piers approximately half way down the slopes. It was decided that a minimum penetration for piling of 30 feet below the bottom of the footing was required for the safety of the structure.

Following this, a Buda earth auger was brought in with which holes approximately 28 feet deep were bored, using 12 and 14-inch bits. The piles were then driven the balance of the distance required. For this purpose, the 33-foot tapered end sections only were used. The Buda auger is self-raising and lowering up to 24 feet, and above that the crane was used to handle the extra long shaft. When boring for the batter piles, the shaft tended to whip at the free end and a separate line was run from the boom of the crane to this ring and attached to the machine. This line was entirely separate from the line used to raise and lower the auger shaft and intended to snub any whipping of the shaft. At the start, work with the auger was slow because much of the sand dropped from the bit as it was removed from the hole. A cylinder 10 inches high and of the same diameter as the bit was made of 3/16-inch metal and fastened to the shaft with the bottom of the cylinder approximately 5 inches above the bit. After this, each time the bit was removed from the hole it would carry a cylinder of sand 15 inches in height. With the use of this cylinder, the diameter of the finished hole was only slightly larger than that of the bit, whereas formerly it was approximately double the diameter of the bit due to the cutting of the sidewalls in removing and placing the bit in the hole. The speed of boring was approximately trebled after the adoption of this cylinder.

Similar driving conditions were encountered at the sites of the other units and the work was handled in a like manner. At the completion of driving, sand was shoveled into the hole around the top portion of the pile and enough water was added to settle it snugly around the pile.

Pier Construction

Following the excavation for the footing of the east pier by the Northwest crane and 1-yard Owen clamshell bucket, the single 46 x 22-foot footing, 6 feet high, with the piles embedded 1½ feet, was poured. On the single footing two piers, 10 feet 4 inches x 11 feet 4 inches each at the base, with an offset for the stone facing, were poured 18 feet 4 inches high to the spring line of an arch of 6-foot 4-inch radius connecting the piers. From the spring line of the arch to the top of the pier is 12 feet 10 inches.

The west pier, of similar construction, was started within a steel sheet pile cofferdam and excavated by a second Northwest crane rigged as a dragline. The steel sheet piles for the cofferdam were skidded in by an International T20 tractor, and were cut for short length by a Victor acetylene torch, which also cut the holes for the handling lines. The short pieces of piles were driven at the locations where the batter piles extended out beyond the cofferdam, so there would be no interference with the driving of the batter piles.

Form Work

In preparation for the erection of the form panels for the piers, rods were stuck into the fresh concrete of the footings to hold the bottom plates of the pier forms. All of the panels were made up in a carpenter yard at the top of the slope, hauled by truck over a circuitous route to the bottom of the hill, and then lifted up into place by the Northwest crane with a 65-foot boom.

The forms were built of ¾-inch shiplap in 6 and 8-inch widths, with no lining as all of the piers were faced with cut stone later so that the finish of the concrete was not an important factor. Studs of 2 x 6 lumber were spaced a maximum of 16 inches and then tapered closer as the form narrowed because of the batter. The wales were all 2 x 6 double, and the panels built with a plate top and bottom for structural strength. Ties, ½ inch in diameter spaced 3 feet apart and 3 feet vertically, as that was

(*Concluded on next page*)

First-Aid Equipment Should Be On Every Job

As America goes into high gear on war production, every man-hour lost jeopardizes the effectiveness of our production program. For this reason safety on the job is even more important than ever before, particularly as the pressure for speed, haste, and large numbers of inexperienced men who have been taken on all tend to increase the number of accidents. Because of this, every contractor should take greater precautions than ever before to avoid accidents.

At the same time, equally thorough preparations should be made to take care of any accidents which may occur on the job. Statistics show that in many cases injuries become much more serious or even fatal because of improper handling of the patient or lack of first-aid treatment at the scene of the accident. This means greater suffering for the victim and his family and in addition more precious man-hours lost.

In its new bulletin No. G-5, Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa., describes and illustrates a number of its safety items, including protective clothing, inhalators, goggles and first-aid equipment. Among the latter items, for use in first-aid stations on construction jobs, are the MSA standard stretcher outfit, a folding stretcher outfit, the MSA combination traction splint, a variety of all-weather first-aid kits, and the MSA Foille burn spray kit.

Copies of this new bulletin and full information on the types of equipment needed for first-aid stations on any type of construction job may be secured direct from Mine Safety Appliances Co. by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

The campaign of United Service Organizations, devoted to helping the men in the service, opened on May 11 and will continue until July 4, with a goal of $32,000,000. Give now!

Are you concerned about your

TRUCKING CAPACITY?

Then mount a Brooks LOAD LUGGER on the chassis and make one truck do the work of many. You can save time, conserve equipment and multiply the efficiency of labor on hand loading jobs. All over the U. S., Brooks LOAD LUGGERS are being used to help speed up contract work where materials are loaded by hand. This is the safest, simplest and fastest method of loading, hauling and dumping. Five to ten Brooks detachable one-piece buckets are employed with each LOAD LUGGER, assuring a system of continuous operation without costly time losses, because there is no need of idle trucks standing by waiting to be loaded. Keep materials moving and profits improving with Brooks LOAD LUGGERS.

Write for complete Brooks Catalog No. 44

706 Davenport Road

Brooks EQUIPMENT AND MFG. CO.

Distributors in all Principal Cities

KNOXVILLE · TENNESSEE

Cut MIXING *Costs*

Low cost production is important and essential to the successful contractor. H & B Bituminous Mixing Plants, both portable and stationary types, are designed with this problem foremost in mind. That the solution has been found is evidenced in the large proportion of Hetherington & Berner equipment to be found on the job today.

Your Inquiries Are Solicited

H&B Hetherington & Berner Inc. 701-745 KENTUCKY AVENUE INDIANAPOLIS, INDIANA

ENGINEERS AND MANUFACTURERS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

AMERICA'S DISTINCTIVE HOTEL INVITES YOU

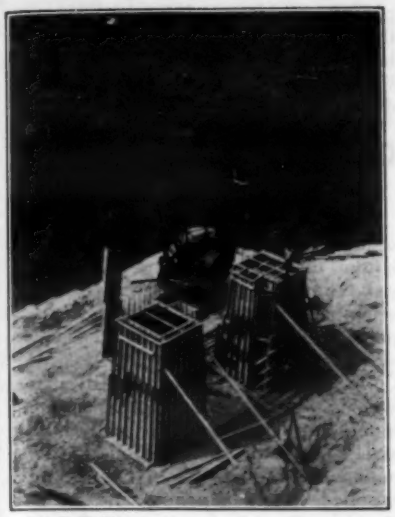
Welcome to the Edgewater Beach Hotel on the occasion of the Meeting of the Associated Equipment Distributors on June 8th to 13th. Here you will find every facility and service for your complete comfort and enjoyment.

W. M. Dewey, *President*. P. J. Weber, *Res. Manager*

EDGEWATER BEACH HOTEL

ON LAKE MICHIGAN

5300 Block Sheridan Road. CHICAGO



C. & E. M. Photo
The east pier forms for the Cut River Bridge near Epoufette, Mich., with a Northwest crane with a 65-foot boom setting the final sections.

Bridge Substructure Poured on Steep Bank

(Continued from preceding page)

the wale spacing, were used with Williams patent removable rods and tighteners.

Concreting

The aggregate for the concrete was delivered by rail to Rexton, Mich., and then hauled 10 miles by truck to a stockpile at the top of the slope. A Speeder crane with a ½-yard clamshell bucket loaded the aggregate into wooden bins, beneath which Johnson weighing batchers were suspended. Single dry batches were hauled by two trucks from the batchers to the Rex 27-E paver, where the 5-bag batches were mixed for delivery to a long Insley semi-circular chute laid down the slope and delivering the concrete to a bottom-dump bucket, which was rehandled by the Northwest crane for pouring into the forms. A Jaeger 10-S mixer mounted on four pneumatic tires was held in readiness as a spare in case of a breakdown of the 27-E machine during the pouring of a monolith.

The piers were poured as a unit from the footing to the spring line of the arch, amounting to a 60-yard pour, while the footing of 235 yards was poured in one day from 9 a.m. to 8 p.m. The pour of the arch and top of the pier amounted to another 60 yards. The cut stone for the arch was set on the forms and then the concrete poured against it.

Water for the concrete and also for the steam boiler was provided by a Jaeger triplex pump, located at the bottom of the gorge, which took water from Cut River.

Scenic Features of Project

Usually when a structure of the size of the Cut River Bridge is built, little consideration is given to the attractiveness of the structure itself from the standpoint of the traveling public. Pier faces may be fluted or, as in this case, faced with cut stone; but there is seldom a location from which the traveler may see the beauties of the structure itself. On this bridge, a flight of steps was built up one side of each abutment, and as a part of the abutment itself a gallery was built with six arched openings from which can be seen the piers and the opposite abutment as well as the view south to Lake Michigan and up the gorge to the north.

Quantities and Unit Prices

The original estimated quantities for the Cut River Bridge, F.A.P. 265G(1), are as follows:

ITEM	QUANTITY		UNIT PRICE
Clearing	16	acres	$50.00
Grubbing	2,564	sq. rds.	.50
Earth excavation	75,317	cu. yds.	.18
Borrow excavation	35,053	cu. yds.	.18
Overhaul	187,891	cu.-yd.-sts.	.01
Dry excavation	2,010	cu. yds.	1.50
32-foot tubular steel piles (furnished)	392		46.00
20-foot tubular steel pile extensions (furnished)	46		32.00
10-foot tubular steel pile extensions (furnished)	272		21.00
Tubular steel piles (driven)	13,304	lin. ft.	.35
Grade B concrete	1,537.4	cu. yds.	13.00
Grade A concrete for slab	251.2	cu. yds.	14.00
Grade A concrete for tubular steel piles	405	cu. yds.	8.00
Cement	2,937	bbls.	2.15
Steel reinforcement	145,178	lbs.	.04
Fabrication and erection structural steel	27,800	lbs.	.0625
Cast steel	11,500	lbs.	.125
Bridge railing	116.5	lin. ft.	8.75
Field painting		Lump sum	200.00
Rubbed surface finish	850	sq. ft.	.10
Sheet copper	100	lbs.	.45
6-inch stone facing	3,590	cu. ft.	2.00
4-in stone facing	1,290	cu. ft.	2.15
Arch stone	440	cu. ft.	3.50
Cap stone	330	cu. ft.	3.40
Manhole frame and cover	2		20.00

Personnel

This contract was started February 27, 1941, and the substructure completed September 30, 1941. The contract for the substructure for this 641-foot cantilever bridge on U. S. 2 near Epoufette, Mich., was awarded to W. J. Meagher & Sons of Bay City, Mich., on a bid of $108,793.06. B. H. Sargent was Superintendent for the general contractor. The grading of the roadway was done by Alpine Excavating Co., of St. Ignace, Mich., under a subcontract, with F. W. Pelletier as Superintendent.

The cut stone for the piers and abutments was furnished by the F. B. Harris Cut Stone Co., Bloomington, Ind., and the face stone by Nicole Stone Co. of Variegated Quarries, Lorain, Ohio, and was placed by the Roy D. Beard Cut Stone Co., of Lansing, Mich., with Roy Hicks as Superintendent. Sand and gravel were furnished by the Inland Lime & Stone Co., Manistique, Mich., and the cement by the Huron Portland Cement Co., of Alpena, Mich. Reinforcing steel was furnished by the Bethlehem Steel Co., the structural steel anchors by the Wickes Boiler Co., Saginaw, Mich., and the steel castings by the Bay City Electric Steel Casting Co., Bay City, Mich.

The contract was awarded by the Michigan State Highway Department, G. Donald Kennedy, Highway Commissioner; and the work was done under the direction of L. W. Fitch as Project Engineer.

Do not talk about your war job! Loose talk about military or naval matters may cost lives.

New Blasters' Handbook

The eleventh edition of the "Blasters' Handbook," completely revised and expanded to 340 pages, has recently been issued by the Explosives Department of E. I. du Pont de Nemours & Co. This handbook contains the latest information about all types of explosives, blasting agents, supplies and accessories, and blasting techniques for the principal industries using explosives.

Copies bound in Fabrikoid may be secured from the Adv. Dept., Room 2506-R, Nemours Bldg., du Pont Co., Wilmington, Dela. Price: $1.00.

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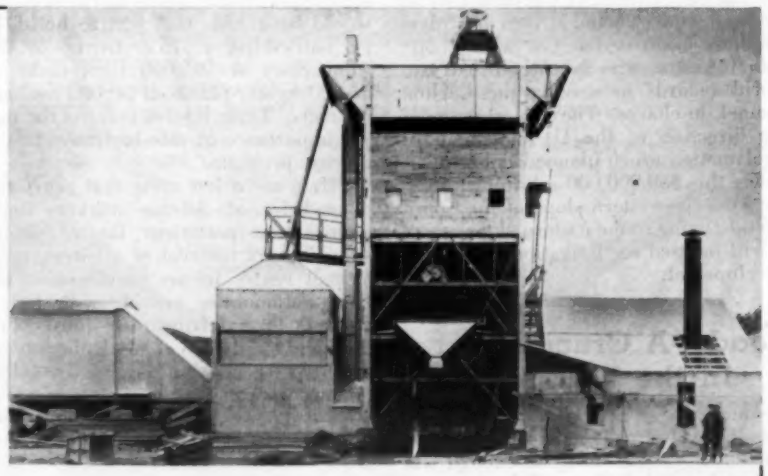

Every plane that roars from a new bomber plant, every new drydock, cantonment, and ordnance plant, is another step along that long Road to Tokio. It's a hard journey, but we're on our way.

At Butler Bin we are proud of our part in paving this vital road, as for the past twenty years we have been proud of our part in paving the highways of America.

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Block Signal System Speeds Up Tunneling

A photoelectric block system is speeding the completion of the 13-mile Continental Divide Tunnel now being driven between Grand Lake and Estes Park, Colorado, by speeding up the traffic of men and materials flowing constantly in both directions. The trains in the tunnel travel on a 24-inch-gage single track with passing tracks at convenient intervals. The function of the signal system is to indicate to train crews the presence of a train in the next section of the tunnel. In addition to preventing accidents, it has also reduced waiting time at passing tracks and has greatly increased the efficiency of all hauling operations.

It was necessary to design a signal system for the tunnel without mechanical or electric switches connected to the rails because water and dirt tend to increase maintenance costs greatly and, further, it is necessary to keep electric currents out of the rails to prevent premature ignition of blasting charges. When the problem was placed before General Electric engineers, they divided the track into blocks of about 6,000 feet, each block ending wherever a turnout occurs for passing. At the beginning and end of each block two G-E photoelectric relays are placed spaced about 30 feet apart. The relays control the operation of red and green signal lights in that block. Each relay has two light sources located across the track, and spaced about 15 feet apart so that only a locomotive or train can operate the lights.

All the green lights are on when the track in a block is clear. When a train or locomotive enters the block and interrupts the light beams directed on the first relay, there is no reaction as this relay controls the already lighted green lights. When the light beams directed on the second relay are interrupted, however, the green lights are extinguished and the red lights turned on. The reverse happens when the train emerges from the other end of the block.

Signal systems for three blocks have been in operation for several months on the east end of the tunnel, and the west end is now being similarly equipped, which will make this the longest tunnel in the world protected by photoelectric block signals.

The S. S. Magoffin Co., with Frank Purvis as Construction Engineer, is driving the east end of the tunnel while the west end is being driven by Stiers Brothers Construction Co. with "Long John" Austin, who recently broke two world records in driving the Carlton Tunnel, in charge. The project is under the direction of the U. S. Bureau of Reclamation which planned and is supervising this $50,000,000 job to bring water from the western slope of the Continental Divide to the eastern slope where it will be used for irrigation and power development.

A muck train in the Continental Divide water tunnel, showing one of a pair of photoelectric relays installed in each block to expedite the movement of materials.

Roads—A Crucial Cog In the War Machine

America's job today, according to Donald M. Nelson, Chairman, War Production Board, is "to make enough war material to lick Hitler and the Japs and to do it in the shortest possible time". This job will require the complete mobilization of every resource in this country—military, industrial and human. With reports already coming to us that thousands of miles of state highways are beyond repair, beyond any possible method of maintenance, we are beginning to realize that our national highway system may become the crucial cog in the machinery of war production. We can not afford to let this part of our machinery fall down because of our failure to make the necessary replacements.

In a recent statement, Charles M. Upham, Engineer-Director, American Road Builders' Association, pointed out, "Over the streets and highways of America now roll materials vital to the construction of planes, tanks, ships, guns and the other supplies needed to make the United States truly the arsenal of democracy. Cars and buses each day carry thousands of war workers to their jobs and home again. Farm-to-market roads and main highways unite to transport food for these workers and for our armed forces as well. One firm, for example, uses trucks and trailers to haul 64,000 pounds of produce to a midwestern camp every week. Army convoys, which contain as many as 1,000 or more trucks, motorcycles and passenger cars, move soldiers and army supplies across the country. On the efficiency of the nation's roads and bridges depends the speed and safety with which these essential men, machines and materials can be moved.

"Highway safety assumes special importance in wartime. Every traffic accident, to a greater or lesser degree, means a reduction of war effort. Materials are not delivered on time, valuable man-hours are lost or wealth is destroyed. Secretary of the Navy Frank Knox estimates that during 1940 a billion and a half man-hours of work were lost by industrial employees in the United States through accidents. Of this total, only 600,000,000 were the result of occupational accidents, while the remaining 900,000,000 hours can be laid to off-the-job accidents, most of which were motor-vehicle accidents. These lost man-hours would have been sufficient to build 45 big battleships or 375 destroyers or 450 submarines or 195,000 light tanks or 75,000 fighter planes or 30,000 medium bombers. These figures indicate the major importance of safe highways to the defense program.

"Here are a few more that prove the dependence of defense workers upon highway transportation. Recent surveys show that 82 per cent of all workers in a steel center in the middle west use their automobiles or ride with fellow workers to and from their jobs. Nine thousand employees at an airplane plant in the west arrive daily in 3,000 automobiles from distances as great as 40 miles away. Eighty-seven per cent of the employees at another important aircraft center use private automobiles for work transportation, while in a central states chemical center, the figure is 92 per cent. In four automotive plants in Michigan, now converted to war production, fully 50 per cent of the employees drive their own cars, while another 20 per cent ride as passengers. It is not unusual for workers in defense plants or at the scene of construction of cantonments to drive a total of 100 miles a day getting from their homes to their jobs and back again."

Even though these men must be taken off rubber as their tires wear out, our highways are still to be called upon to meet the burden of exceedingly heavy traffic on whatever kind of tires we are using one and two years from now. If the large volume of light passenger cars are taken off the road they must be replaced with heavy buses to transport these hordes of factory soldiers to their tasks of fighting the war in factories. Save the roads and you will save production.

Cleaning Equipment By Vapor-Sand Blast

Another step in lengthening the life of equipment, as well as steel structures, is the thorough cleaning of all steel parts to remove paint which may be covering rust, clean out the rust and repaint. To facilitate this work, such as cleaning out cracks, Vapor Blast Mfg. Co., 333 South 16th St., Milwaukee, Wis., has developed a system of combining sand blasting with water vapor and a solution of rustproofing compound called Metrolux. This vapor is expelled with the abrasive sand from an atomizing gun and moistens the particles of sand broken by impact in cleaning, and washes the dust out of the air. Dirt and scale removed from the object which is being cleaned is also moistened by this vapor and kept from blowing into the air as dust.

In addition to structural steel, bridges and welded joints, this method of cleaning is used on hardened concrete surfaces to remove laitance and to roughen the surface prior to the next pour. The materials used in the Vapor Blast system are any hard sand, ranging from 20 to 80 mesh, and water. In one hour of continuous operation, the equipment vaporizes approximately 20 gallons of water and uses a quarter of a ton of sand. In addition, from 10 to 40 gallons of water is used for washing the clean surface with the sand turned off by the operator at the nozzle by means of a remote control valve.

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Your Share and Ours In the War Program

(*Continued from page 4*)

effect the lessons learned in the construction of airport runways and in the multitude of soil studies which have been made throughout the nation to assure successful subgrade and base construction on highways and at the home bases of our fleets of air fighters.

Contractors are demonstrating regularly, by their letters and personal inquiries, that they are following closely the newest developments in methods and equipment used in the construction of access and camp roads and airport drainage, runways, bases and surfaces, as described in their technical and trade papers. They must keep abreast of the times in order to be ready for the next wartime job, as well as to keep up with the competition bound to develop when highway reconstruction again increases in volume.

Manufacturers are continuing their programs of redesign in tune with the wartime availability of materials, so that, when more equipment is needed for an increased highway program, they can fill the requirements with more economical machines rolling from their factories. One lesson that all manufacturers have learned in these past two years since Hitler let hell loose in Europe is the efficient and effective use of welding. We all know that many more new methods and devices will result from the faster tempo of thought of our mechanical geniuses in this day of demand for speed and economy in production. These manufacturers are now devoting up to 100 per cent of their plant capacities to high-speed war production, as reported in our February issue. In spite of the necessarily reduced production of construction equipment, the manufacturers are still serving contractors and other users of highway equipment by furnishing spare parts, advising on maintenance that will extend the life of the equipment, and reporting their dual services to the military and construction fronts in their advertising.

Contractors and Engineers Monthly is serving each of these—highway department, contractor and manufacturer—more diligently than ever before, by constant editorial discussion of the new methods developed to speed access road and runway construction under unfavorable conditions, improved methods of soil stabilization, construction of earth dams for flood control to protect munitions-manufacturing plants and areas, grading of airports, camps and industrial sites, and other forward strides in design, construction and maintenance during these intense times. Our job is to record the details of progressive methods, to report the news of construction to you, so that the public dollar and the private dollar may produce the most in construction for the American way to Victory and a rational peace.

United we go forward to serve the wartime needs of our armed forces; this is a war in which the productive and service capacity of our nation is called upon to do a bigger job than ever before. Don't let MacArthur down! Build and work for democracy!

Minnesota Road Work Sets New State Record

Regardless of how much wartime restrictions may throttle down highway programs for the duration, Minnesota will enter this period with the advantage of having just completed a year distinguished by the largest trunk-highway construction program ever undertaken out of current revenues in the state's history, according to a recent statement released by the Minnesota Highway Department.

Even with the financial aid of large bond-issue proceeds, there have been only two previous years in which the amount of trunk-highway improvement work placed under contract has exceeded 1941. These were 1931, the peak construction year under Minnesota's $14,335,000 trunk-highway improvement bond issue, and 1936, when funds from the $8,500,000 Federal-Aid matching bond issue were available.

The total work on trunk highway improvements, either performed or under contract at the end of 1941, amounted to $15,189,000. These improvements and their status are as follows:

Work carried over, January 1, 1941	$ 2,130,000
Contracts awarded during 1941	13,059,000
Total carried and contracted	$15,189,000
Completed and paid for during year	11,197,000
Carried over for completion in 1942	$ 3,992,000

In addition, there was $1,563,000 of Federal-Aid secondary construction on county roads, contracted under the State Highway Department's supervision but not utilizing trunk-highway funds, and $1,140,000 in maintenance contracts under which periodic maintenance and roadway betterment operations were performed. The totals also do not include $223,000 worth of new construction on which lettings were held late in the year, but on which no contract awards have been made pending approval by defense authorities.

The projects involved in carry-over and 1942 contracts include 632 miles of grading, with temporary gravel surfacing and other construction incidentals; 240 concrete box culverts; 598 miles of various types of stabilized base; 370 miles of new bituminous surfaces and 120 miles of concrete pavement. In addition, 40 new trunk-highway bridges, including stream crossings, railway overheads and underpasses, and traffic-separation structures, were completed during the year, and 28 more are under construction or under contract but can not be completed until sometime this year. There is 10 miles of concrete paving under contract which will not be completed until the coming season, but the funds are encumbered out of last year's revenues to pay for the entire cost, as is the case with all work carried over on 1941 contracts.

Corrugated Steel For Sheet Piling

Corrugated steel sheet piling, cold-rolled from open hearth steel, has advantages for those construction jobs that require minimum weight and maximum strength with economy of cost, ease of installation, high salvage value, easy handling and transportation. This type of piling, made by Caine Steel Co., 1820 N. Central Ave., Chicago, Ill., is available in both standard and interlocking sections and has been used on such work as sewers, sewage treatment plants, water filtration plants, dams, levees, cofferdams, bridges, bulkheads, locks, and cut-off walls.

The standard section is made of 8, 10 or 12-gage steel and is recommended for jobs where the piling is to be installed temporarily, requiring frequent removal. It is equipped with two to five clips which are cold-pressed from heavy material and electrically welded to the sheet. The clips are 6 inches long and attached to the pile 15 inches from each end. The intervening space between top and bottom clips is divided proportionately when more than two clips are used. The interlock-section piling is recommended where piling is to remain permanently in place. The interlock sections, like the standard, are 1¾ inches deep overall and the corrugations are on 4-inch centers. Corner pieces and other special shapes are available.

A 12-page catalog is available on Caine corrugated steel sheet piling, covering the two types mentioned as well as driving caps and pulling tongs, with considerable data, illustrations and diagrams of typical applications. Copies of this catalog may be secured gratis by mentioning Contractors and Engineers Monthly.

Rosin Research Studies

The establishment of the Pine Chemicals Fellowship at Mellon Institute of Industrial Research, University of Pittsburgh, for the year 1942 has been announced by the Hercules Powder Co., Wilmington, Del. The purpose of the fellowship will be to develop new uses for rosins, and will emphasize applications of these materials in the war effort, expanding the use of naval stores products—turpentine, pine oil and rosin and their derivative products.

Hercules manufactures naval stores products only by the wood process, the distillation of pine wood, and extraction of naval stores by means of solvents. Gum naval stores, however, which are produced by tapping pine trees and draining the sap from them, have also been included in the research program as possible sources of chemical products. Dr. George B. Feild of the Mellon Institute will be the fellow in charge of these studies.

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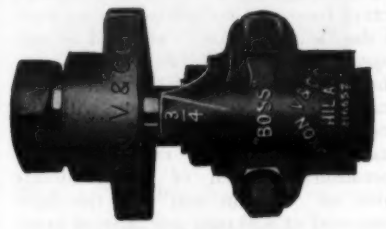

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Bituminous Mat Laid On Stabilized Gravel

S. S. Roberts Const. Co. Laid A Road Oil Top on Gravel Base, Using Blades for Mix And Final Spreading

✦ HIGHWAY 34 east of Artesian, S.D., was rejuvenated for a distance of 6.936 miles last season by the completion of a bituminous top on the stabilized gravel base. This was an old gravel road regraded in the autumn of 1940 and 1,000 tons of gravel added per mile for a 24-foot width. The "service gravel" gave sufficient strength to the road to allow traffic to use it safely throughout the winter and spring.

In the spring a layer of stabilized gravel base was completed, using such of the "service gravel" as could be salvaged from the initial 2-inch layer. Then a second layer of the same thickness was completed, making, with the first layer, about 4,000 tons of stabilized base 32 feet wide per mile. The final operation consisted of a bituminous cover or "interim mat" on the base composed of 450 tons per mile of graded-gravel aggregate with a maximum ¾-inch screen size which gave a ½-inch plus mat 24 feet wide.

Prime and Mixing

The contractor used a Cleaver booster to heat the road oil in the railroad tank cars before delivery to his Etnyre 1,000-gallon distributor. After thoroughly cleaning the surface of the stabilized gravel with a power-driven rotary broom, it was primed with 0.33 gallon per square yard of SC-1 asphaltic road oil. This was allowed to cure for a sufficient length of time so that it would not pick up under traffic. As soon as the prime was thoroughly cured, the dense graded gravel aggregate for the bituminous mat was windrowed down the center of the road, shaped up and equalized, then flattened and shot with approximately 5.3 per cent by weight of SC-4 road oil and then thoroughly mixed by blading with a Caterpillar No. 12 power grader and three Adams power graders.

Spreading and Rolling

After the mixing was completed, the windrow was moved to one side of the road by the power graders, and one half of the road given a tack coat of 0.1 gallon per square yard of SC-4 road oil by the Etnyre distributor. As soon as this had dried out sufficiently for the power graders to operate on it, two of the Adams diesel power graders working in echelon spread the mixed mat material for the 12-foot width on that side and then moved the balance of the windrow over on it while the remainder of the road was given its tack coat and then the remaining windrow spread on the second side of the road.

After the spreading was complete the mat was rolled by a smooth steel-faced pull-type single-wheel roller meeting the specified requirement of 250 pounds per square inch pressure. This was pulled by a truck until thorough compaction was secured. After the rolling was completed a "fog coat" or light flush coat of 1/14 gallon per square yard of SC-4 road oil was applied. This is not a seal but was intended to catch any dry spots on the road and was very quickly absorbed by the surface of the mat.

Quantities

The major quantities on which the contractor made his bid of $33,828.43 were:

Base course	19,376	tons
Bituminous cover coat mat	3,121	tons
Clay binder	747	tons
Water, 1,000 gallons	632.4	M gallons
Base course rolling	6.936	miles
Road oil SC-1	43,581	gallons
Road oil SC-4	66,761	gallons

Personnel

The contract for the bituminous-mat stabilized-base course, FAP 133 (3) in Miner County, S. D., on Highway 34, was awarded to S. S. Roberts Construction Co. of Rapid City, S. D. Lester Davis was Superintendent for the contractor throughout the work. For the South Dakota State Highway Commission, R. V. Summerside was Resident Engineer.

Texas Bond Policy And Reduced Revenue

To prevent a possible default in payment of county and road district bonds which had previously been assumed by the state where the funds were used in the construction of state highways, the Texas State Highway Commission has announced that it will decline to take advantage of the provisions of the bond assumption law passed September, 1941, under which several millions of dollars of county and district bonds could now be used for new state highway construction. This action was taken in anticipation of a heavy decline in revenues from the gasoline tax due to restricted travel during the war emergency. It is now impossible to calculate accurately the amount of income which will accrue to the road bond redemption fund from the one cent of the gasoline tax set aside to service obligations made eligible by previous legislation. Consequently, the Commission is unwilling to place additional burdens on the road bond fund in the face of declining revenues.

The law permits the Texas Highway Commission to accept county and road district funds from bond issues where the issues were voted prior to January 2, 1939. The proceeds from these bonds, when used on state highway construction, would be eligible for payment from the road bond fund on the same basis as bonds assumed under the original law passed in 1932 and its subsequent amendments. Since there is a critical deficiency in many of the materials needed in heavy highway construction and since highway construction costs have increased substantially, it is felt that more economical construction will be obtained after the war when prices may return to their former levels.

D. C. Greer, State Highway Engineer, who is also Chairman of the Board of County and District Road Indebtedness, speaking for the State Highway Commission stated, "Restrictions on the motor industry will necessarily bring about a substantial reduction in gasoline tax revenues, at least for the duration of the war. It appears that such reductions in revenue will present a most serious problem to the Board of County and District Road Indebtedness in providing funds for servicing of bonds heretofore assumed by the state. Therefore, it will be the policy of the Commission to refrain from the acceptance of funds from bond issues and, insofar as the highway commission is concerned, all future construction of highways shall be on a 'pay-as-you-go' basis from funds currently available."

The Commission directed that a copy of its statement of policy be sent to all county officials with the suggestion that "a similar study in the individual counties be made with the expectation that such studies will reveal to the county officials that bond issues for the construction of roads are not advisable, at least under present conditions".

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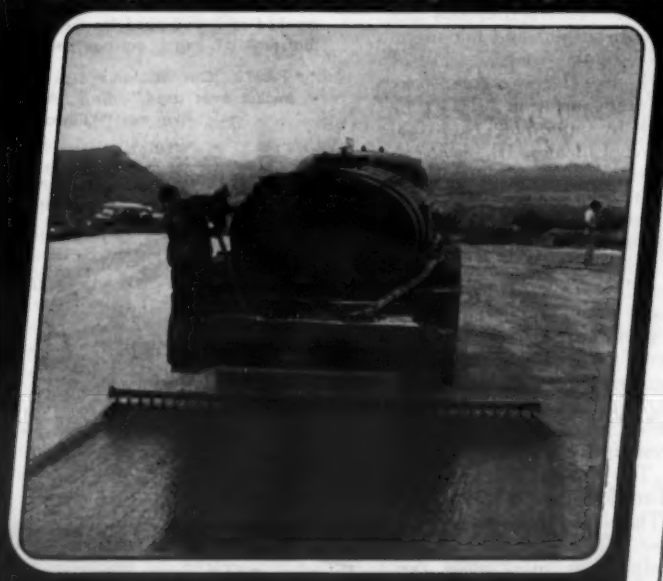

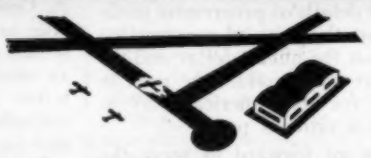

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MACHINERY & EQUIPMENT CO., Inc.
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C. & E. M. Photo

Unusual teamwork on a Henry A. Raemisch & Co. grading contract on Wisconsin 64. An RD8 pulled a 22-yard Carryall with an RD8 and 12-yard Carryall as a pusher and for cutting backslopes. Two 22-yard units were used and the smaller outfit picked up its loads whenever the two larger units were both at the dump.

Protective Coating For Steel and Wood

In these days when we must seek alternate products for many of those to which we have become accustomed, we are making every effort to call to our readers' attention those which have been developed and approved. A corrosion-resisting coating for the protection of steel, wood or concrete, which is readily available because it consists of material requiring no priority or preference rating to purchase, has been announced by the Carbozite Corp., 903 First National Bank Bldg., Pittsburgh, Pa. This Carbozite coating is manufactured from a pyrobitumen ore which is not used in any munition or war material and consequently is freely available when supplied in returnable containers.

This coating can be either sprayed or brushed on or dipped, in the case of product finishing, dries naturally in from 6 to 8 hours, or can be baked dry to an enamel-type finish in a few minutes. A special Carbozite Shop Coat has also been developed which dries naturally in from 20 to 30 minutes and still maintains its flexibility. It is widely used for coating export products as protection against sea water and air. Carbozite Coating forms a uniform, self-leveling film which will bond securely to any clean material and provides complete protection against corrosion from acid or alkali fumes, sulphur or salt air or water, smoke or soot, and is totally unaffected by moisture, sunlight or any corrosive or carbonizing agent encountered in ordinary industrial usage, according to the manufacturer.

It has been used successfully as a protective coating for pipe handling sulphurous drainage waters from coal mines, withstanding over three years of service where uncoated steel pipe corroded in two to three weeks. It is being used daily on all types of steel and wood construction, exposed machinery and equipment, buried and exposed piping, piping handling corrosive materials, steel piers, ship bottoms and hulls, concrete piers and foundations, and other applications where corrosion has previously caused excessive maintenance or replacement.

Complete information will be furnished by the manufacturer to those writing direct on their business or official letterhead and mentioning this item.

Stationary Compressors

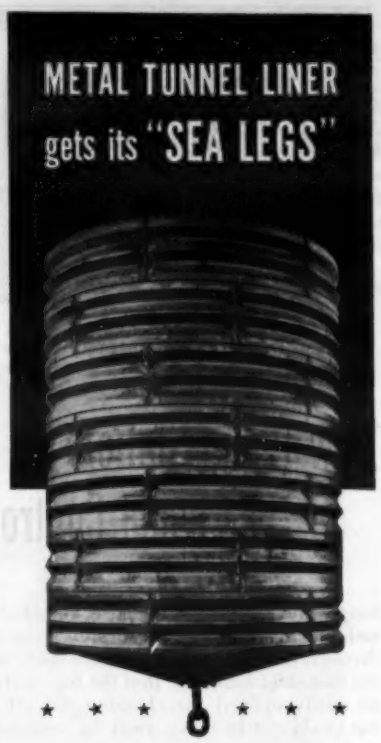
A catalog devoted entirely to heavy-duty continuous-service air compressors with various combinations of mountings, on extended base, with or without prime mover, and with or without air receivers, has been issued by Schramm Inc., West Chester, Pa. This catalog gives all of the dimensions, weights and compressor specifications as well as data on electric-motor, gasoline and diesel-engine drive for 85 to 420-cfm units.

YOU can really make time processing soil-cement roads and runways with heavy-duty, big-capacity Killefer Material Mixers. They have the strength and stamina to work at top speed behind high-powered tractors. The vibrating action of the double-coil spring steel standards and the broad double-end points insure thorough mixing of wet or dry materials. A crank-type regulator accurately adjusts and maintains the working depth.

Do a better, faster job of pulverizing with a heavy-duty Killefer Offset Disk Harrow. Its rugged construction, wide-angled gangs, and oversize disk blades assure full penetration in all conditions. It leaves the ground level without ridges or furrows.

Avoid costly delays—use heavy-duty Killefer Material Mixer equipment for processing soil-cement.

KILLEFER EQUIPMENT
for Processing Soil Cement



War is changing the shape of steel. Now it is tanks, planes and guns instead of peacetime products. Occasionally, as in this Navy buoy, you'll recognize an old familiar friend. It's a wartime, nautical version of ARMCO Tunnel Liner Plates.

Perhaps it will help remind you how much ARMCO Liner Plates will some day contribute to easier, safer tunneling. Gage for gage, ARMCO heavy duty liner is stronger (section modulus) than any other plate. On a strength—weight basis it costs less at the start. Work moves fast because one man handles the light sections and only structural wrenches are needed for assembly. Where completed rings can be spaced to take advantage of partly self-supporting ground, you may actually buy fewer plates.

Remember that after the war ARMCO Liner Plates will be back—better than ever before—to help you cut costs and speed tunnel work. Armco Drainage Products Association, 605 Curtis Street, Middletown, Ohio.

ARMCO
TUNNEL LINER PLATES

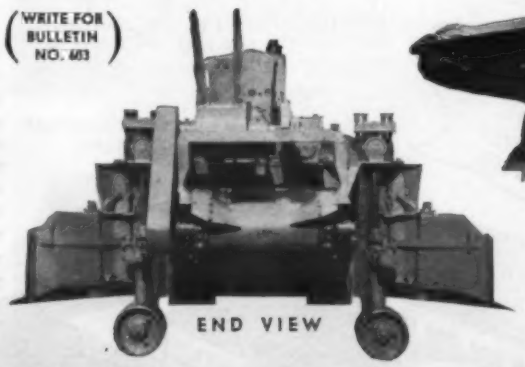
Make YOUR subgrading operations *pay a profit:*

A STANDARD Subgrader prepares subgrade at 50% to 90% saving!

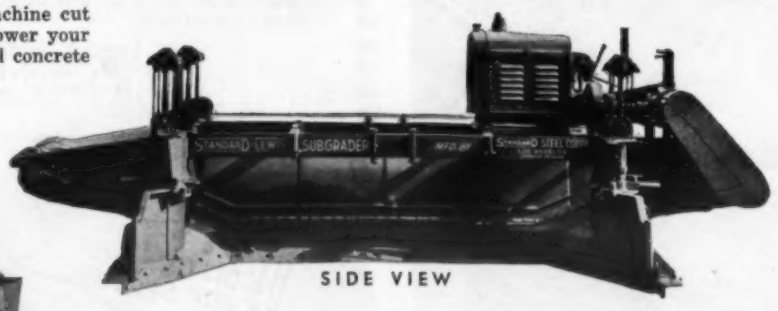
One operator and a helper can prepare subgrade with this machine at the lowest cost ever attained.

Not only does the efficiency of this machine cut down subgrading costs, but it will also lower your costs of rough grading, form setting, and concrete or asphalt placing.

(WRITE FOR BULLETIN NO. 603)



END VIEW



SIDE VIEW

And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. *Write us for further information.*

STANDARD STEEL CORPORATION 5001 So. Boyle Los Angeles

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York

Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name_____

Position_____
(Or Type of Business)

Address_____

(City)_____

N. B., A two dollar bill, check or postage stamps will be entirely acceptable.

C. & E. M. Photo
The concrete pump discharge box and 48-inch corrugated pipe leading to the Ohio River, a portion of the U.S.E.D. flood-protection project at Wellsville.

New Pump Station For Flood Control

(*Continued from page* 43)

suggestion, and own expense, he made welded rings of old ½-inch bolts looped through the top grating and the sides of the cast steel basket so that the top could be easily opened for cleaning the inlet but could not be taken away by amateur junk collectors.

Quantities

The major quantities involved in this $90,503.00 contract were as follows:

Excavation, common	2,300 cu. yds.
Excavation, borrow, including haul	27,100 cu. yds.
Excavation, special	5,800 cu. yds.
Compacted fill	5,400 cu. yds.
Uncompacted fill	350 cu. yds.
Impervious fill in dike	25,000 cu. yds.
Gravel fill	1,500 cu. yds.
Concrete for miscellaneous structures	345 cu. yds.
Concrete in pumping station	405 cu. yds.
Furnishing and placing reinforcing steel	60,000 lbs.
Furnishing cement	900 bbls.
Furnishing and placing copper water stops	150 lbs.
Furnishing and installing 39-inch concrete pipe	1,060 ft.
Furnishing and installing cast-iron pipe	7,300 lbs.
Furnishing and installing 6-inch tile drain	250 ft.

Personnel

Bids for the Wellsville, Ohio, Flood Wall, Part 2, including the pumping station, were received on April 28, 1941, and the contract awarded to Sanctis Construction Inc., of Pittsburgh, Pa., on May 29, 1941, the contract allowing 270 calendar days for completion. For the contractor, the work was performed under the supervision of Ernest Sanctis. The project was under the direction of the Pittsburgh District Office, U.S. Engineer Dept., Lt.-Col. D. Lee Hooper, District Engineer, with G. P. Fleetwood as Resident Engineer at Wellsville.

Inside of Arc Welding Shown in Color Film

As a contribution to the program of training welders for their part in war construction and production, a new six-part all-color sound movie "The Inside of Arc Welding" has just been made available by the General Electric Co., Schenectady, N. Y.

This interesting and instructive film handles the subject of good arc welding technique strictly from the educational point of view and is intended for use in training welders. The color photos of the arc welding process and the examples of good and bad beads, with the clear and concise commentary accompanying the film, present the subject in terms which the beginner can readily understand and absorb.

Each of the six parts of "The Inside of Arc Welding" is complete, covering in full detail one particular phase of arc welding, is 400 feet long, runs for 10 minutes, and can be used on sound-equipped 16-mm projectors only. Part 1 deals with the fundamentals and the four factors making for good welds; Part 2 covers welding in the flat position; Part 3, the horizontal position; Part 4, flat and horizontal positions with alternating current; Part 5, vertical position; Part 6, overhead position.

Copies of this film are available, free of charge, for showing to groups, or may be purchased at cost for use in schools and welding classes. Inquiries in regard to the film should be addressed to the Visual Instruction Section, General Electric Co., Schenectady, N. Y.

Highway History Bulletin

The latest issue of the Engineering Bulletin of Purdue University "Highways—Then And Now" is a reprint of a paper prepared for presentation by Professor Ben H. Petty at the Annual Meeting of the Upper Peninsula Road Builders Association in Ironwood, Michigan, last June. The author has made use of a wide variety of sources in the preparation of this historical document on the development of road construction in all parts of the world, ending with the development of our modern highway system in the United States.

Copies of this bulletin, Highway Series No. 52, may be secured from the Engineering Extension Department, Purdue University, Lafayette, Indiana, free.

CONTINENTAL BULLETIN

RE-VITALIZED RUBBER MAINTAINS QUALITY

Continental chemists and engineers have perfected the production of Re-Vitalized Rubber to the point where, in most cases, it will fully meet your requirements. Whether it is Hose, Packing or other Mechanical Rubber Goods, every time you specify Re-Vitalized Rubber, crude rubber is conserved for war orders.

Let the Hand of the Specialist aid you in re-designing your rubber products so that Re-Vitalized Rubber may be used in filling your specifications. Meet eventualities *now*. Rubber *is* Ammunition. Don't waste it.

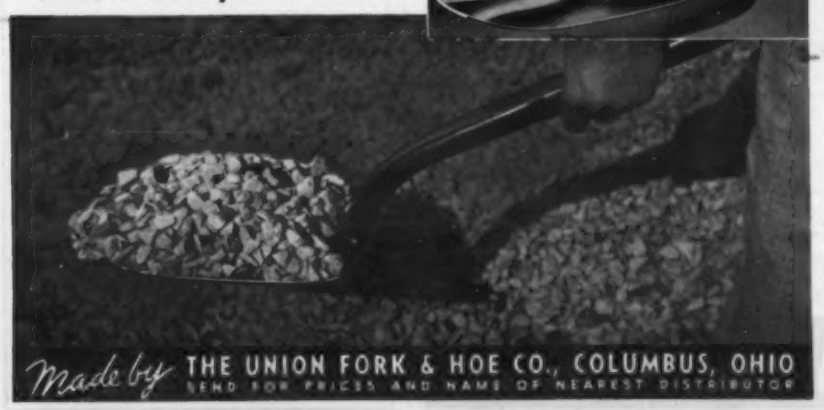
From Factory Bulletin Board of the
CONTINENTAL RUBBER WORKS
MAKERS OF THE VITALIC LINE SINCE 1905
ERIE, PA., U.S.A.

Do you **KNOW** *your shovels?*

Those Red-Handled RAZOR-BACKS you see everywhere speed up work, slow down replacements

because

they're the first shovels forged with a backbone (60% thicker center from tip to top, tapered to the sides). Cost you no more!



Made by THE UNION FORK & HOE CO., COLUMBUS, OHIO
SEND FOR PRICES AND NAME OF NEAREST DISTRIBUTOR

MACHINES MUST LAST

HERE ARE FIVE THINGS YOU CAN DO TO KEEP 'EM RUNNING

*1. Check frequently for worn parts. Replace before excessive damage is caused.

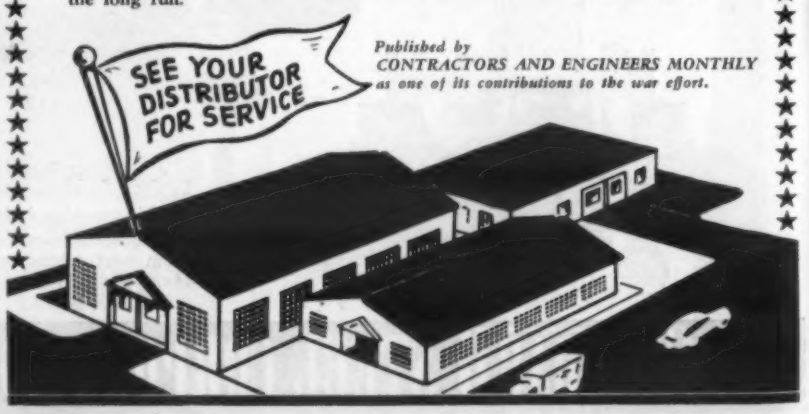
*2. Keep equipment lubricated at regular intervals. Closely follow instructions.

*3. Keep it clean—don't let dirt and grit cause excessive wear. Clean machines daily.

*4. Maintain a reasonable stock of parts for quick replacement. See your Distributor for parts needed.

*5. Save old and worn parts for possible salvage. Your Distributor can help you save money.

Above all—see your Distributor for SERVICE! Trained experts know your equipment better than anyone else. They will save you time and money in the long run.



Published by
CONTRACTORS AND ENGINEERS MONTHLY
as one of its contributions to the war effort.

AISC Annual Awards For New Steel Bridges

(*Photos on page 4*)

Announcement has been made by the American Institute of Steel Construction of its Awards for the most beautiful steel bridges erected during 1941. First place in the Class A Award, for bridges costing $1,000,000 or more, was given to the Rainbow Bridge over the Niagara River, between Niagara Falls, N.Y., and Niagara Falls, Ontario, (C. & E. M., September, 1941, pg. 6). This structure, which cost $4,000,000, was built by the Bethlehem Steel Co. for the Niagara Falls Bridge Commission. Waddell & Hardesty and Edward P. Lupfer Corp. were the engineers and Aymar Embury II, architectural consultant.

The most beautiful bridge in Class C, covering bridges costing less than $250,000, is the Fairmount Boulevard Bridge in Hunting Valley Village, Ohio, built for Cuyahoga County by the Fort Pitt Bridge Works. The structure, which cost $114,000, was designed by John O. McWilliams, County Engineer of Cuyahoga County. Honorable mention in this class went to the Wabash Railroad Subway Bridge in Wayne County, Mich., built for the county by the American Bridge Co., and designed by H. A. Shuptrine, Bridge Engineer of the Wayne County Board of County Road Commissioners, and J. C. Bousfield, Chief Engineer of the Wabash Railroad.

In the movable bridge class, the Award was given to the Passaic River Bridge on State Route 25 between Newark and Kearny, N. J. This bridge was designed by Morris Goodkind, Bridge Engineer of the New Jersey State Highway Department, with Howard, Needles, Tammen & Bergendoff as Consulting Engineers, and built by the American Bridge Co. at a cost of $2,055,498.47. Honorable mention in this class was given to the highway bridge over the St. Johns River in Jacksonville, Fla. Designed by J. H. Dowling, State Highway Engineer, and E. S. Fraser, Bridge Engineer of the Florida State Road Department, this $750,000 structure was built by the Mount Vernon Bridge Co.

In Class B, covering bridges costing between $250,000 and $1,000,000, no Award was made, but three Honorable Mentions were made to the Meramec River Bridge on Route 21TR between St. Louis and Jefferson Counties, Missouri; and the Wax Lake Outlet highway and railroad bridges at Calumet, Louisiana. The first of these, costing $328,211.48, was designed by C. W. Brown, Chief Engineer, and N. R. Sack, Bridge Engineer, of the Missouri State Highway Commission and was built by the Stupp Brothers Bridge & Iron Co. The Wax Lake Outlet highway bridge was designed by engineers of the Louisiana Department of Highways and built by The Mount Vernon Bridge Co., at a cost of $597,500; while the railroad bridge which is part of the same project (C. & E. M., July, 1941, pg. 2) was designed by Modjeski & Masters, Consulting Engineers, with the J. F. Coleman Engineering Co. as Associates, and built by the Bethlehem Steel Co. for the Southern Pacific Railroad at a cost of $837,995.

The Jury of Award was composed of Professor Harold E. Wessman, Department of Civil Engineering, New York University; Professor Carlton T. Bishop, School of Engineering, Yale University; Grosvenor Atterbury and Frederick J. Woodbridge, Architects, New York City; and Kenneth Reid, Editor of *Pencil Points*.

A New Lead Primer Replacing Aluminum

Steel fabricators and contractors now have available an alternative for aluminum paint priming, the manufacture of which has been prohibited by a Government freezing order. This new metal lead primer, made by the Midland Paint & Varnish Co., Cleveland, Ohio, is claimed to be equal in its protective value to a good grade of aluminum paint as it is rust inhibiting, preventing rust from working from the inside of the material through the finished coat.

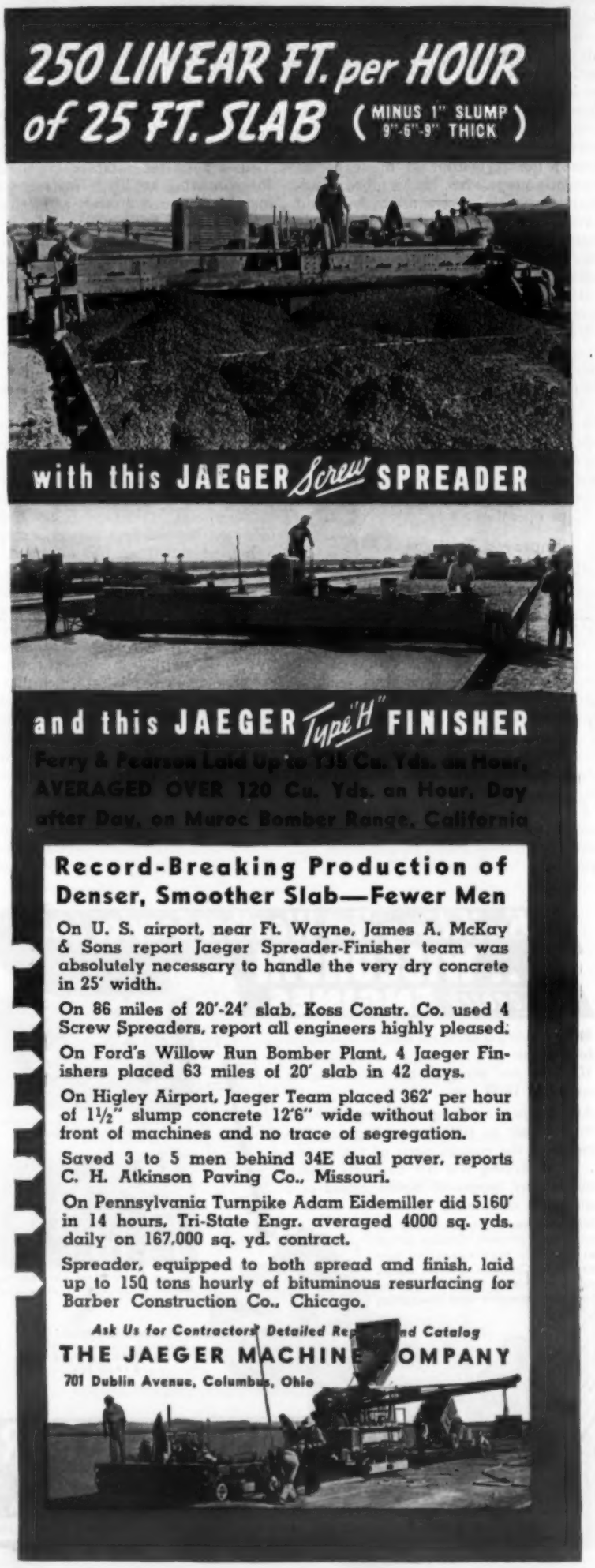
Hyspar metal lead primer may be brushed, sprayed or dipped and dries hard in 4 to 5 hours. It is neutral gray in color, will not bleed through the finishing coat or need more than the usual finishing coat required when aluminum was used. The manufacturer reports that this paint was originally prepared several years ago to meet the special problems of painted outdoor displays and large neon spectaculars which were subjected to all kinds of weather, thus requiring a paint of unusual protective ability with high elasticity. It is reported that this paint will not crack or flake off and holds tight to metal under rapid climatic changes. It is also highly resistant to the salt-impregnated air along the seaboards.

This new metal lead product can be obtained from the manufacturer in two forms: in large quantities already mixed for application, or in separator cans with the metal paste separate from the liquid, to be mixed in the same manner previously required for good aluminum finish. Full details with prices may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Faster Dirt Moving

This is the subject of a new booklet "Your Dragline Can Move Dirt Faster" recently issued by the Page Engineering Co., Dept. D-3, Clearing Post Office, Chicago, Ill. Devoted to Page automatic dragline buckets, this bulletin contains full details on how these buckets can help you increase production as well as information on Page buckets in action on the home front.

Copies of this bulletin may be secured direct from the manufacturer.


250 LINEAR FT. per HOUR
of 25 FT. SLAB (MINUS 1" SLUMP 9"-6"-9" THICK)
with this JAEGER Screw SPREADER
and this JAEGER Type "H" FINISHER
Ferry & Pearson Laid Up to 135 Cu. Yds. an Hour, AVERAGED OVER 120 Cu. Yds. an Hour, Day after Day, on Muroc Bomber Range, California
Record-Breaking Production of Denser, Smoother Slab—Fewer Men
On U. S. airport, near Ft. Wayne, James A. McKay & Sons report Jaeger Spreader-Finisher team was absolutely necessary to handle the very dry concrete in 25' width.
On 86 miles of 20'-24' slab, Koss Constr. Co. used 4 Screw Spreaders, report all engineers highly pleased.
On Ford's Willow Run Bomber Plant, 4 Jaeger Finishers placed 63 miles of 20' slab in 42 days.
On Higley Airport, Jaeger Team placed 362' per hour of 1½" slump concrete 12'6" wide without labor in front of machines and no trace of segregation.
Saved 3 to 5 men behind 34E dual paver, reports C. H. Atkinson Paving Co., Missouri.
On Pennsylvania Turnpike Adam Eidemiller did 5160' in 14 hours, Tri-State Engr. averaged 4000 sq. yds. daily on 167,000 sq. yd. contract.
Spreader, equipped to both spread and finish, laid up to 150 tons hourly of bituminous resurfacing for Barber Construction Co., Chicago.
Ask Us for Contractors' Detailed Re... and Catalog
THE JAEGER MACHINE ...OMPANY
701 Dublin Avenue, Columbus, Ohio

Experimental Work On All-Weather Roads

(*Continued from page 34*)

and, in many instances, was greater than the amount of commercial filler added.

7. The addition of a considerable amount of soil filler was effective in imparting satisfactory stability to the road-oil sections as well as to the cut-back asphalt section to which it was added.

8. The addition of soil filler to one of the cut-back sections was of apparently greater benefit than was re-mixing to increase stability and eliminate surface cracking.

9. Failure to eliminate the volatile portion of the cut-back asphalt prevented the formation of the expected cementitious residue. Had a more rapid-curing material been used, it would have lost a greater amount of volatile matter during the manipulation and would therefore have provided greater stability.

10. The desirability of mechanical compaction for greater immediate stability was indicated, although self-propelled rollers of the type then available did not appear suited to the conditions existing on the roads.

11. Inefficient equipment added to the difficulty of construction. The narrow steel-tired equipment, non-flexible in operation, prevented rapid and successful prosecution of the work. The need for equipment designed for the various operations was very evident.

Improved Equipment Aids

Concurrently with the increase in knowledge of the properties of bituminous mixtures came the realization that old-fashioned makeshift equipment not only was inefficient, but its use prevented the practical application of information gained by research in the laboratory. Obviously the ability to design satisfactory mixtures with a variety of materials served no useful purpose unless such design could be accurately produced by the construction operations.

Fortunately, with the increase in volume of low-cost road building, improvements have been made in the types of equipment in use and in the development of new equipment. Large-size pneumatic tires have replaced the narrow steel tires on blade machines; mechanical shifting has replaced hand shifting; and units having greatly increased power have made possible almost absolute control over the mixing.

On the experimental sections it was practically impossible to control the depth of mixing as the steel-tired wheels sank through the mix. With the blade machines available at the present time, mixing to a given depth is no longer such a difficult task even on loosely bonded bases such as existed on the experimental roads. At the present time, moreover, mixing is not confined to blade machines or to stationary mixing plants, but can be done on the road by traveling mixers. These machines pick up the untreated material from the roadway, pass it through the mixing chamber where it is accurately proportioned and mixed with the bitumen, and then deposit the mixture on the road for spreading by blade machines or it may be delivered directly to mechanical spreaders and finishers.

Self-propelled smooth rollers, formerly the only type available, were not considered suitable for use on work such as described herein, but the need for some initial compaction was felt. As a substitute for self-propelled rollers, types of pulled rollers were tried. Although such rollers had smooth continuous surfaces, they were a decided improvement over the old type. Perhaps, however, the greatest improvement was the development of the pneumatic-tire multiple-wheel roller. Such rollers simulate the action of traffic and provide the kneading movement that is so beneficial but which is not readily obtained with smooth rollers, except to a limited extent on hot mixtures.

With the foregoing equipment now available for use, it becomes possible not only to construct a road having the properties designed for it but to permit the use of different methods of construction to accomplish a given purpose. On the experimental road a 4-inch mat was to be constructed. With the equipment then available this almost automatically implied the two-course construction that was specified. With present-day equipment, blade mixing could be accomplished to the complete depth in one operation or, if desired, two-course mixing could readily be done. The use of traveling mixers now available would insure a uniform mixture both as to depth and composition.

Final Results

The results now being obtained in Nebraska are very satisfactory and illustrate what can be accomplished by laboratory research and field application of the results of such research. Neither field studies nor laboratory research alone would have made possible the definite results being obtained at the present time. In this respect the experimental road was of considerable value not only because of the direct information it developed but also because it definitely exposed many of the problems that required a solution before a successful and economical plan could be developed for bituminous construction with sandy soils.

It is of additional interest to note that the information developed by this experiment was gained at a net saving in maintenance rather than at a somewhat increased cost which may frequently result and which is normally justified in experimental construction.

The average maintenance cost of a gravel road typical of roads in the sand hill region and adjoining the experimental road was $280 per mile annually for a period of nine years. In addition to surface maintenance, this sum included the cost of snow control and removal, maintenance of right-of-way, equipment repairs and depreciation, and administration. Of this total cost per mile, approximately 33 per cent was required for the replacement of the sand-gravel surfacing material and 33 per cent for blading and dragging the surface. In other words, an annual expenditure of $186 per mile was required to maintain the surface as constructed but without permanent improvement. The surface maintenance of the experimental road costs $92 per mile annually, which is in marked contrast to the $186 per mile annual cost of the sand-gravel surfaced road. This is a definite saving in addition to such intangible benefits as conserving material and providing a superior day-to-day riding surface.

Prepared from a report by Paul F. Critz, Highway Engineer, Public Roads Administration, and C. M. Duff, Testing Engineer, Nebraska Department of Roads and Irrigation, published in *Public Roads* for December, 1941.

Traffic Counts Show Less Motor Travel

The nation-wide tire rationing and restrictions on the use of gasoline along the eastern seaboard and in the Pacific northwest have already reduced long-haul travel by passenger automobiles by almost 40 per cent, according to the American Automobile Association. The AAA estimates that gasoline consumption by private passenger cars is 20 per cent below that of April, 1941.

Another indication of less automobile travel is a recent report from the National Park Service, stating that visits to parks in the first three months of 1942 dropped by 30 per cent. Some privately operated resorts, which depend on the patronage of owners of automobiles, estimate that their business has dropped off 50 per cent compared with one year ago.

A recent traffic report from W. G. Pruett, State Highway Director of Alabama, covering ten stations scattered over the state of Alabama, shows that while traffic in January, 1942, was 106.9 per cent of that in January, 1941, and that the traffic was still above 1941 in February, when the counts showed 102.1 per cent, in March, 1942, traffic was only 93 per cent of the traffic in March, 1941. Only three of the traffic stations show an increase in March, 1942, traffic over that of one year ago while the remaining seven show decreases of as great as 27.4 per cent.

Building Hot Weather Service into ... WISCONSIN AIR-COOLED ENGINES

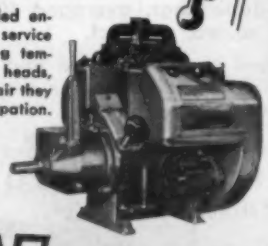
● By moving a constant flow of 500 cubic feet of air per minute, at a velocity of 1000 ft. per min., at a normal engine speed of 1800 rpm. . . .

And by *proportioning* this large volume flow of air to suit the cooling requirements of the various parts of the engine . . . directing the air currents where needed by means of baffle plates and airstream channels . . .

Wisconsin heavy-duty air-cooled engines give efficient, reliable service at extremely high operating temperatures. Cylinders, cylinder heads, valves and pistons get all the air they need for adequate heat dissipation.

Combination fan-flywheel provides ample cooling blast.

Balanced air-blast distribution reaches all parts that need cooling.



Illustrated is the Model VE-4 V type 4 cyl. engine. Other types and sizes, 1 and 4 cyl., 1 to 35 hp.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation

MILWAUKEE, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

Protect wearing parts with STOODY HARD-FACING ALLOYS

Construction equipment that wears rapidly and is usually replaced every few hours or every few days can be made to last three to ten times longer by protecting areas exposed to abrasion with Stoody Hard Facing Alloys. These metals, supplied in welding rod form and applied by standard oxy-acetylene or electric welding equipment, are so much harder and more wear-resistant than ordinary steel they prolong the life of tractor parts, scrapers, tamp rollers and crushing equipment many times, reducing parts replacements and eliminating unnecessary delays.

In most cases parts are hard-faced before they are placed in service and are given another application when the original deposit wears away. When this procedure is followed, wear never has an opportunity to attack an unprotected surface and one part can, therefore, be made to last indefinitely. Worn parts can also be hard-faced profitably. Common practice is to fill in low spots with ordinary steel welding rods and apply a final layer of hard metal to retard future wear. Worn equipment salvaged by welding and hard-facing invariably delivers longer service than new parts.

Here are typical examples of how contractors are using Stoody rods to save time and reduce costs:

(Right) Worn drive sprocket rebuilt with Stoody Self-Hardening. In addition to prolonging the life of sprockets 200% the hard metal also reduces wear on costly track pad pins.

(Above) Spreader Augers are subjected to severe wear and normally last but a short time. Hard-facing surfaces subjected to abrasion with Electric Tube Borium prolongs auger life as much as six times. (Right) Hard-facing bulldozer tips with either Electric Tube Borium or Coated Stoody Self-Hardening keeps corners square and extends blade life 3 to 6 times.

STOODY CO., 1134 W. Slauson Ave., Whittier, California

STOODY COMPANY Hard Facing Alloys

Resident Engineer Has Office De Luxe

From Dog House to Palace Is the Cinderella Story. Moral: Have at Least Three Contractors, and Two Subs

✦ FROM Massachusetts to the Middle West provided us with the transmutation of a resident engineer's office from a hen house to palace. A converted hen house was actually the official headquarters of a resident engineer and his entire field party on one job visited in the Bay State. But that is now forgotten in the glamour of an office we ran across last summer, complete even to housekeeping equipment and window boxes.

Trading on the good nature of a group of contractors, three principal contractors and two subcontractors, whose legal duty it was to provide protection from wind and weather for the bodies and records of the engineering staff, the Resident Engineer managed to secure the following: (1) a well built office, (2) a brick veneer for the office, (3) window boxes with petunias, (4) a telephone, (5) an American flag, supplemented by the words and music of The Star Spangled Banner mounted for careful study, (6) one broom, (7) one rake for landscaping the grounds, (8) one rocking chair, (9) two substantial kitchen chairs set in glass insulators, not to protect the tender minds of the staff from shock (they were engineers), but the work desk was just too high for chairs of normal height and the insulators gave the needed boost.

One contribution which added daintiness to the place was window drapes, furnished by a late arrival among the engineering staff. He had used the curtains on another job because the populace had insisted upon looking in the windows while he was making out reports and it just annoyed him. So on this job, the curtains graced the windows of the bungalow office.

True to all proper construction, the structure faced south with the door in the center and windows at either side glorified with the window boxes and flowers. In addition to the two windows in front, there was a triple window over a long work table on the west side, and also windows, with their curtains, on the north and east sides. A telephone on the work table and a built-in file under the table at the north end almost made the place look businesslike. Above the file was the regulation multiple-shelf unit for the wide variety of reports necessary. At the northeast corner was a shelf with sieves for soil analysis, and with a very mysterious sliding door at the front, well camouflaged so that it was not easily discovered. It was merely the cache for cases of Pepsi-Cola and Coca-Cola, of which more later. Hanging on the wall of this corner were a saw, hammer, hatchet, and standing below them rods and a soil auger.

Toward the south end of the east wall were shelves for the soil sample cans *and* an ice box, neatly painted in battleship gray, containing iced bottles of the two Colas and, of all things for engineers, chocolate-milk drinks. The fact that the dairyman who brought the chocolate milk also provided the ice may explain their presence. The cold drink box was run on the honor system, with everybody behind in his payments until pay day. Kept neatly behind the front door was a broom, scarcely worn.

The rake for the front lawn was tucked away on the rafters, and in addition to the chairs already mentioned there was one folding chair so that four engineers, weary from their day's work, might be seated at one time without draping themselves on the work bench. The cuspidor was a novel affair consisting of a heavy base and wire top with waterproofed cones, not unlike those used at soda fountains but much wider and shallower.

Yes, we admit we have omitted the prize art collection, consisting of sixteen of those pictures of girls of most remarkable physique, one girley calendar, and one picture modestly covered and marked "For Men Only".

Does your office compare with this? If not, ask the contractor.

C. & E. M. Photo

All the comforts of home in the field office of a resident engineer—the soft-drink cooler is on the opposite side of the room.

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New England Economy In Road Maintenance

(*Continued from page* 31)

In an interview, J. E. Lawrence, Maintenance Engineer, Department of Highways, stated that the maintenance program in Massachusetts, as a result of the order to reduce the use of asphalt and tar in highway maintenance, would naturally be considerably smaller than heretofore. It will be necessary to take chances and do more paint patching, which will reduce the use of asphalt but will increase the costs due to increased time by labor. The paint patches are made by the regular maintenance crews who tow a kettle of RC-3 or RC-5. This is used to swab the pavement, which is then covered with ½ to ¼-inch stone and is not rolled. Either MC or RC asphalt, emulsified asphalt or tar is used for patching and all patches are rolled. In the past it has been the practice in the spring to place a cold-mix patch at all breaks in the pavement and then remove the patch during the warm weather and replace it with the same type of material as the adjacent pavement. Under present conditions the temporary patch will be left in for the duration. Mr. Lawrence reported, "There will be an immediate cut of at least 50 per cent of our usual requirements for asphalt and tar for maintenance purposes and this will be adjusted as the regulations from Washington require."

In addition to the state highway mileage of 2,000 miles, there are about 10,000 miles of secondary and tertiary state-aid roads in Massachusetts which are maintained by the State. The greater portion of these are dirt and gravel. This year, some of those roads which would have been built up with gravel and bituminous-treated will be built up with the gravel and treated with calcium chloride.

Connecticut

Connecticut uses both tar and asphalt for the maintenance of state highways and buys the bituminous materials required for the maintenance of town roads, but only in exceptional cases does it handle maintenance for a town. In 1941 Connecticut used 4,352,599 gallons of tar and 1,310,035 gallons of asphalt, the latter figure including 47,948 gallons of asphalt joint filler for the maintenance of concrete roads.

Surface treatment and shoulder maintenance are done in the same manner in Connecticut, using 0.16 gallon per square yard of tar or asphalt applied by a pressure distributor and immediately covered with about 12 pounds per square yard of sand applied by a spinner-type spreader. This type of treatment is referred to as a seal while the use of RC-5 asphalt at the rate of 0.25 gallon per square yard covered with ½-inch stone or 0.33 gallon per square yard covered with ⅜-inch crushed trap rock is referred to as an "armor coat" or surface treatment.

A. L. Donnelly, Director of Highway Maintenance, Connecticut State Highway Department, reports that to maintain the low-cost type of bituminous roads common in Connecticut it will be necessary to use at least 80 per cent of the amount of tar and asphalt mentioned above on the state highway system.

During 1941, the towns of Connecticut purchased over 10,000,000 gallons of tar and asphalt for application on town roads.

Rhode Island

The state highway mileage in Rhode Island comprised 801.41 miles, as of December 31, 1941, which is broken down into the various types of pavement in the tabulation below:

Surface-treated and mixed-in-place gravel	157.28 miles
Waterbound macadam	82.45 miles
Cement concrete	174.21 miles
Bituminous macadam	260.20 miles
Bituminous concrete (coarse aggregate)	15.53 miles
Bituminous concrete (graded aggregate)	40.91 miles
Bituminous surface on concrete base	41.34 miles
Dual type (reinforced concrete and bituminous macadam)	29.41 miles
Total	801.41 miles

G. H. Henderson, Chief Engineer, Rhode Island Division of Roads and Bridges, states that the bituminous-macadam pavements in Rhode Island are built with a seal and require very little maintenance for a long period. In an interview shortly after the "freezing order" on bituminous materials, Mr. Henderson stated that the greatest need in Rhode Island was for materials for patching bituminous surfaces and the filling of cracks in concrete pavements. In 1941 a total of 800,000 gallons of tar and asphalt were used for surface treatment, chiefly on the gravel roads and shoulders, and it was anticipated that about 1,000,000 gallons would be needed this year, including that required for patching and crack filling.

The parking lane shoulders, which are a feature of Rhode Island's modern highways, are built of gravel, using the same foundation as that of the pavement but extended out for an extra width of 9 to 10 feet. This is primed and then given a 2-inch surface of an inexpensive bituminous mix like the Durfee mix developed in Rhode Island and now used quite extensively in New England. This mix is given a surface treatment with stone chips and bituminous material. Other gravel shoulders throughout the state have a minimum width of 5 feet.

New V-Belt Design

A more uniform pull and higher resistance to heat and oil are features of the new black E-C cord multi-V belt recently announced by Goodyear Tire & Rubber Co., Akron, Ohio. This belt is the result of years of field testing and the research work of the compounding department of the company's tire division.

The belt is sheathed with a new tougher black cover for longer wear and more uniform pull, taking advantage of the fact that the toughest longest-wearing compounds are made with black-carbon stocks. The better pull and balanced performance result from the more consistent coefficient of friction of the new black cover.

The compass cord construction concentrates the load-carrying cords in the neutral axis where all pull evenly, increasing the efficiency of the belt. This new belt is made in all standard cross-sections and lengths and is sold in sets, precision-matched under operating tensions.

Complete information regarding this new V-belt and its application to drive problems in the construction industry may be secured direct from Goodyear by referring to this text.

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THE CARE OF LE ROI ENGINES Page 1

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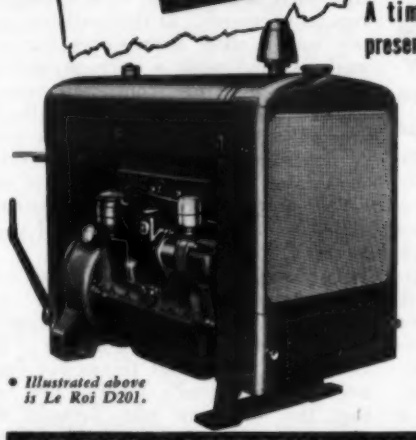

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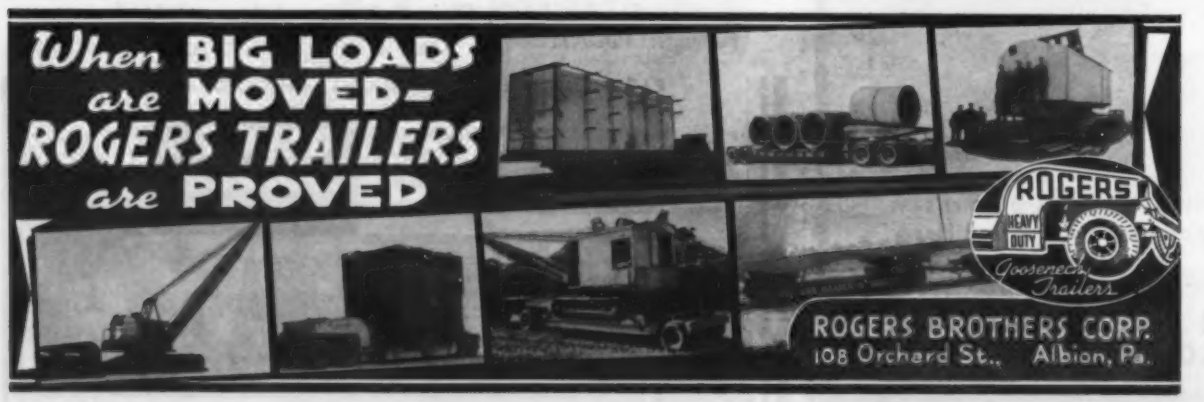

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Left, a 2-cubic yard concrete bucket in carrying position on a standard Dempster-Dumpster and, right, the bucket in place on the elevating standard discharging into a wheelbarrow in place below.

New Dispensing Bins Also Haul Concrete

A new concrete bucket equipped with two discharge gates so that two wheelbarrows or concrete buggies may be loaded from it at the same time has been developed by Dempster Brothers, Inc., Knoxville, Tenn. This new bucket, shown in the illustration, is carried on the standard Model LF Dempster-Dumpster in the same manner as the standard containers. The bucket may be transported either with or without the auxiliary stand, which is readily detachable.

The usual procedure in the use of the Dempster-Dumpster concrete bucket is to leave the auxiliary stand on the job and transport the concrete bucket from the mixer to the job and deposit it on the stand, carrying an empty back for a refill while the full bucket is being unloaded into wheelbarrows or buggies rolled beneath the hoppers. By utilizing the auxiliary stand, it is possible for the upper section of the bucket to be lowered by the Dempster-Dumpster hoisting units beneath the chute at the concrete mixer, thereby requiring no special elevation or auxiliary connections to discharge the concrete directly into the bucket. The concrete bucket, of course, can be utilized also with a transit mixer. All that is necessary is for the transit mixer to be sufficiently high above the bucket when it is on the auxiliary stand to permit the proper angle for discharge.

The bucket can be furnished in 2, 3 and 4-yard capacities and can be handled by the 200LF, 300LF and 400LF Dempster-Dumpster hoisting units. The 400LF can handle all the buckets, the 300LF can handle the 2 and 3-yard capacities and the 200LF can handle only the 2-yard capacity.

Complete information, including the priorities necessary for the purchase of these buckets, may be secured direct from the manufacturer.

Greater Efficiency From Rugged Drifter

Several improvements in design characterize the new D-505 Ingersoll-Rand drifter which, operating with air at 90-pounds pressure, has shown itself to be 34 per cent more effective than previous I-R 4-inch bore machines, and 52 per cent more effective at 70-pounds pressure. The features which contribute to this performance, according to the manufacturer, are that the wall section of the fronthead is 10 per cent thicker, the shank aligner is 18 per cent longer and 8 per cent thicker, and an improved chuck design of heavier construction has been included.

The design of the piston-stem cushion bearing permits a heavier metal section in the cylinder and furnishes better support. There is a port on each side of the cylinder which balances the piston within the cylinder. The air to the front end of the cylinder passes directly between the ratchet and the head of the rifle bar unrestricted by small ports. This assures good hole-cleaning, and aids in supplying constant lubrication to all moving parts.

The D-505 is built with a sturdy rifle bar for strong rotation. The rifle bar pawls are reversible to increase their life. The throttle handle is more readily accessible for the operator and it is well protected by the backhead so that it can not be broken easily.

A complete description and more detailed information on the D-505 will be found in Form 2786 which will be sent to readers by Ingersoll-Rand Co., 11 Broadway, New York City, free on request.

New Virginia Route To Honor H. G. Shirley

At a recent meeting of the Virginia State Highway Commission, a resolution was passed adding a new road to the state highway system and naming this new route the Henry G. Shirley Memorial Highway, in honor of Virginia's late State Highway Commissioner, an outstanding highway engineer who was associated with the development of Virginia's highway program for the past twenty years.

The route was designated to run from a point on Route 1, near Occoquan Creek, to a point to connect with the War Department's strategic network in Washington, D. C. This new road has been made necessary by the expansion of Fort Belvoir and the intensive activities in the vicinity of Washington, as well as to relieve the congestion which exists on this section of Route 1 in normal times.

It will be a limited-access highway, the first to be constructed under provisions of an Act passed at the last General Assembly of Virginia, authorizing the construction of limited-access highways. As the designation indicates, this highway will be of the most modern design, providing for access at limited points, with separation structures at all road and railroad intersections. Its general design will be a dual highway, consisting of two 24-foot travel lanes separated by a 30-foot grass plot.

Surveys for this project have been underway for approximately six months and plans are being rushed by the joint work of the Public Roads Administration and the Virginia Department of Highways. It is expected that permission to construct this highway will be granted on the basis of an access road and that bids will be called for sometime in August.

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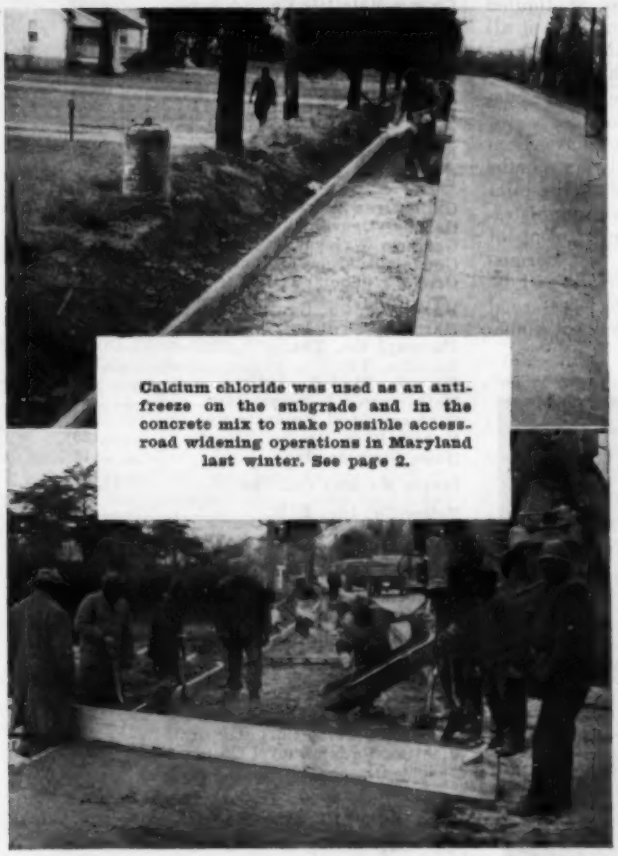
Contractors and Engineers Monthly

Building the forms for one of the footings of the overhead structure on the new Belt Line Highway at Eau Claire, Wis. The long fill in the background carries the by-pass to the new Chippewa River Bridge. See page 9.

C. & E. M. Photo



Calcium chloride was used as an anti-freeze on the subgrade and in the concrete mix to make possible access-road widening operations in Maryland last winter. See page 2.

Above, at left, the culvert crew of Norman County, Minn., completing an installation of 36-inch r-c pipe culvert. At right, engine overhaul in the county's repair shop. Below, the snow-plow line-up at the garage in Ada. See page 2.

C. & E. M. Photos

At left, a view looking west from the top of the Cut River gorge near Epoufette, Mich., with the east pier of the new bridge in the foreground and Lake Michigan in the background. Below, a stockpile of Union Monotube piles on the east side of the Cut River gorge, used for the foundation of the piers. At right, the Rex 27-E paver, set up at the top of the east bank of the gorge, from which concrete was chuted to the east pier footings. See page 11.

C. & E. M. Photos